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MINERALS YEARBOOK

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Volume III

U.S. DEPARTMENT OF THE INTERIOR
GALE A. NORTON, Secretary

U.S. GEOLOGICAL SURVEY
CHARLES G. GROAT, Director

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Foreword

This edition of the U.S. Geological Survey (USGS) Minerals Yearbook discusses the performance of the worldwide minerals and materials industries during 2001 and provides background information to assist in interpreting that performance. Content of the individual Minerals Yearbook volumes follows:

- Volume I, Metals and Minerals, contains chapters about virtually all metallic and industrial mineral commodities important to the U.S. economy. Chapters on survey methods, summary statistics for domestic nonfuel minerals, and trends in mining and quarrying in the metals and industrial mineral industries in the United States are also included.
- Volume II, Area Reports: Domestic, contains a chapter on the mineral industry of each of the 50 States and Puerto Rico and the Administered Islands. This volume also has chapters on survey methods and summary statistics of domestic nonfuel minerals.
- Volume III, Area Reports: International, is published as four separate reports. These regional reports contain the latest available minerals data on more than 190 foreign countries and discuss the importance of minerals to the economies of these nations and the United States. Each report begins with an overview of the region's mineral industries during the year. It continues with individual country chapters that examine the mining, refining, processing, and use of minerals in each country of the region and how each country's mineral industry relates to U.S. industry. Most chapters include production tables and industry structure tables, information about Government policies and programs that affect the country's mineral industry, and an outlook section.

The USGS continually strives to improve the value of its publications to users. Constructive comments and suggestions by readers of the Minerals Yearbook are welcomed.

Charles G. Groat, Director

Contacts

Information about the U.S. Geological Survey, its programs, staff, and products may be accessed on the World Wide Web at URL http://www.usgs.gov or by contacting the Earth Science Information Center at 1-888-ASK-USGS. For specific information about this publication, contact the Chief, International Minerals Section, Minerals Information Team, at (703) 648-7732, or the Chief, Publication Services Section, Minerals Information Team, at (703) 648-7790. Additional minerals information may be accessed on the World Wide Web at URL http://minerals.usgs.gov/minerals.

Acknowledgments

The Country Specialists in the Minerals Information Team, U.S. Geological Survey, in preparing the International Review regional books of volume III of the Minerals Yearbook, extensively use statistics and data on mineral production, consumption, and trade provided by various foreign Government minerals and statistical agencies through various official publications. The cooperation and assistance of these organizations are gratefully acknowledged. Statistical and informational material was also obtained from reports of the U.S. Department of State, United Nations publications, and the domestic and foreign technical and trade press. Of particular assistance were reports submitted by the Resource Reporting Officers and other officers of the Department of State in U.S. Embassies worldwide. Their contributions are sincerely appreciated. Internal statistical support was provided by the staff of the Data Collection and Coordination Section of the Minerals Information Team.

The regimes of some countries reviewed in this volume may not be recognized by the U.S. Government. The information contained herein is technical and statistical in nature and is not to be construed as conflicting with or being contradictory of U.S. foreign policy.

John H. DeYoung, Jr.
Chief Scientist, Minerals Information Team

Contents

Foreword, by Charles G. Groat iii
Contacts iv
Acknowledgments, by John H. DeYoung, Jr. v
Europe and Central Eurasia, by Chin S. Kuo, Richard M. Levine, Harold R. Newman, Walter G. Steblez, and Glenn J. Wallace 1.1
Adriatic Balkans—Albania, Bosnia and Herzegovina, Croatia, Macedonia, Serbian and Montenegro, and Slovenia, by Walter G. Steblez 2.1
Austria, by Harold R. Newman 3.1
Belgium and Luxembourg, by Harold R. Newman 4.1
Bulgaria and Romania, by Walter G. Steblez 5.1
Commonwealth of Independent States—Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan, by Richard M. Levine and Glenn J. Wallace 6.1
Czech Republic, Hungary, Poland, and Slovakia, by Walter G. Steblez 7.1
Denmark, the Faroe Islands, and Greenland, by Chin S. Kuo 8.1
Estonia, Latvia, and Lithuania, by Chin S. Kuo 9.1
Finland, by Chin S. Kuo 10.1
France, by Harold R. Newman 11.1
Germany, by Harold R. Newman 12.1
Greece, by Harold R. Newman 13.1
Iceland, by Chin S. Kuo 14.1
Ireland, by Harold R. Newman 15.1
Italy, by Harold R. Newman 16.1
Malta, by Harold R. Newman 17.1
Netherlands, by Harold R. Newman 18.1
Norway, by Chin S. Kuo 19.1
Portugal, by Harold R. Newman 20.1
Spain, by Harold R. Newman 21.1
Sweden, by Chin S. Kuo 22.1
Switzerland, by Harold R. Newman 23.1
United Kingdom, by Harold R. Newman 24.1

THE MINERAL INDUSTRIES OF

EUROPE AND CENTRAL EURASIA

By Walter G. Steblez, Chin Kuo, Richard M. Levine, Harold R. Newman, and David R. Wilburn

As a part of the Eurasian landmass, Europe and Central Eurasia encompass continental territory that extends from the Atlantic coast of Europe to the Pacific coast of Russia and includes the British Isles and Iceland. Greenland in the northwest Atlantic Ocean and Sakhalin and Kurile Islands off the Sea of Japan in the Pacific Ocean, which are political extensions of Denmark and Russia, respectively, also are treated in this volume.

The post-cold-war European and Central Eurasian environment (1990-2001) included new political and economic configurations and trends. In the countries of Central Europe (Czech Republic, Hungary, Slovakia, and Poland), the Balkans (Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Macedonia, Serbia and Montenegro, and Slovenia, but excluding Greece), Central Eurasia [the Commonwealth of Independent States (CIS), which comprises Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Uzbekistan, and Ukraine], and the Baltic countries (Estonia, Latvia, and Lithuania), central economic planning was replaced with varying degrees of transition to more open political systems and market-based economies.

The CIS was founded initially in 1991 by several republics of the former Soviet Union (FSU) to promote free economic space in the FSU region; it does not, however, have supranational powers, and its member countries have equal standing in international law. The Central European Free Trade Agreement (CEFTA) was founded on December 21, 1992, by Czechoslovakia (now, the Czech Republic and Slovakia), Hungary, and Poland. The chief purpose of CEFTA was to harmonize all spheres of economic relations among the member countries in conformity with standards and principles promulgated by the General Agreement on Tariffs and Trade (GATT) and the World Trade Organization (WTO). CEFTA members also viewed the organization as a necessary first step toward ultimate accommodation within Western European political and economic structures. Slovenia, Romania, and Bulgaria joined CEFTA in 1996, 1997, and 1999, respectively.

Economic integration in Western Europe evolved into the formation of the European Union (EU), which is a supranational entity that comprises Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom. The admission of CEFTA member countries and other countries in the region was one of the significant political questions that had faced the leadership of the EU. The European Community (EC) opened accession negotiations in 2000 with Bulgaria, Latvia, Lithuania, Malta, Romania, Slovakia, and Turkey. The EC was already negotiating formally with the following countries: Cyprus, the Czech Republic, Estonia, Hungary, Poland, and Slovenia. No date has been set, but membership is expected to be extended to these six countries by about 2005. This enlargement would represent the single largest EU enlargement. The last enlargement was in 1995 when Austria, Finland, and Sweden acceded. Candidate countries will face great challenges. These countries must fulfill such political and economic criteria as achieving stability of institutions guaranteeing democracy, the rule of law, human rights, and respect for and protection of minorities; having a functioning market economy and the capacity to cope with competitive pressure and market forces within the EU; and being able to take on the obligations of EU membership, which includes adherence to the aims of political, economic, and monetary union.

These and other issues made the integration of even the more transitionally advanced formerly centrally planned countries slow and contingent on structural conformity with EU norms. Because of the very different paths of development that Western Europe and Central Eurasia, Central Europe, and the Balkans followed after the Second World War, an economic asymmetry between these two areas emerged and remained throughout the post-cold-war period of the 1990s. This asymmetry framed the initial commercial relationship in the minerals sphere between the two areas. Western Europe imported raw materials from, toll-smelted raw materials in, sold equipment and technology to, and invested in the mineral development projects in the formerly centrally planned economy countries largely without reciprocal activities on the part of the latter.

The U.S. Geological Survey (USGS) would like to thank the following foreign Government agencies and international institutions and private research organizations for providing mineral production statistics, basic economic data, and mineral exploration and other mineral-related information:

- Albania—Albanian Institute of Statistics;
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  - Ministry of Industry and Trade;
- Denmark—Danmark og Grønlands Geologisk Undersøgelse [Geological Survey of Denmark and Greenland];
- Estonia—Geological Survey of Estonia;
- Finland—Statistics Finland;

- Germany—Bundesanstalt für Geowissenschaftern und Rohstoffe [Agency for Geosciences and Raw Materials];
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  - Central Statistical Office;
- Romania—National Institute of Statistics;
- Serbia and Montenegro—Statistical Office;
- Slovenia—Government of Slovenia;
- Slovakia—Geological Survey of the Slovak Republic, Ministry of the Environment of the Czech Republic National Statistical Office;
- Ukraine—State Statistics Committee; and
- United Kingdom—British Geological Survey General Economic Conditions.

Economic Conditions and Issues

Europe and Central Eurasia remained a substantial participant in the world mineral economy by occupying important roles at both poles within that economy as a supplier and consumer of all major mineral commodity groups. In 2001, Western Europe continued to be a major world processing and consuming region and accounted for a significant share of world production and consumption of ferrous and nonferrous metals, whereas the role of Central Eurasia remained that of a major world supplier of minerals. Central Europe and the Balkans, however, played a much lesser role with respect to supply and disposition of most mineral commodities.

Western Europe, which had a population that exceeded 392 million, had one of the most advanced regional economies in the world with a gross domestic product (GDP) that amounted to about $9.6 trillion. Although Western Europe had a population that was 35% greater than that of the United States, its GDP was about 5% less than that of the United States.

On January 1, 1999, the EU adopted the euro (€) as its new single currency for the member states that had satisfied the macroeconomic conditions necessary to join the European Monetary Union (EMU). Although euro banknotes and coins will not enter into circulation until January 2002, the euro was being used in electronic transactions and as a unit of account whose value has been fixed irrevocably with the participating member state's currencies. Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, and Spain will be the initial EC-member countries to use the euro. Not yet part of the EMU are Denmark, Sweden, and the United Kingdom.

Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia, and Turkey have applied for EU membership; this is expected to develop important issues for discussion in 2002. Candidate countries represent 45% of the EU population and 7% of its GDP, per capita GDP varies between 24% of the EU average in Bulgaria and 82% in Cyprus.

In contrast to Western European countries, the transitional economy countries of Central Eurasia and Central Europe and the Balkans, which had a combined population that exceeded 410 million, had a combined GDP that amounted to about $2.8 trillion, or about 29% of that of Western Europe and about 28% of that of the United States.

In 2001, within the transitional economy group of countries, such factors as the growth of per capita income continued to appear to be more favorable with respect to CEFTA member countries whose average per capita GDP was more than 2.5 times greater than that of the CIS but whose negative demographic rate of growth was significantly worse than that of the CIS (table1). Compared with Western Europe's low but positive demographic growth (0.32% compared with that of 2000), the population growth rates of Central Eurasia, Central Europe, and the Balkans were varied, which showed a net decrease of 0.20% within the CEFTA group of countries; this was a net increase of 0.65% within the unaffiliated Balkan group of countries and a net increase of about 0.5% in the Central Eurasian subregion. The CIS's average GDP growth rate of nearly 8% in 2001 was greater than that in most groupings within the region, which reflected varying combinations of low economic baselines, favorable rises in world prices for hydrocarbons, and the corresponding production increases for such commodities as petroleum by major producing countries (Kazakhstan, 13.6%, Russia 7.4%, Turkmenistan, 6.8%, and Azerbaijan, 6.4%).

The countries of Western Europe had no common mineral policy. The mining legislations of the different countries of the EU and Europe as a whole differ widely in objectives and regulatory details. Even though the EU was not involved in harmonization of the various countries' mining laws, this was nevertheless taking place owing mainly to increased competition for mining and exploration investments.

As a major world mineral-processing and mineral-consuming region, Western Europe consequently remained a major determinant of world demand for all mineral commodities. With the near exhaustion of its mineral reserves and the decline in its role as a world mine producer of minerals, Western Europe continued to be a major producer and fabricator of such metals as copper, iron and steel, lead, and zinc, which were based largely on imported raw materials. Germany remained Western Europe's dominant smelter and refiner of most metals.

Despite the diminution of Western Europe's importance as a metals mining subregion, the subregion developed into an important world financial center and the headquarters of such major global mining transnationals as Anglo American S.A., Rio Tinto plc, and Billiton plc.

Western Europe played a significant international role in the extraction and processing of certain industrial minerals and mineral fuels. Significant petroleum and natural gas resources had been developed in the North Sea, and coal reserves were adequate. Germany remained a significant mine producer of a number of industrial minerals and coal.

The countries of the CIS had an extensive minerals economy that accounted for a major share of the world's extraction of fuels, industrial minerals, and metals and the production of processed mineral products, which included metals and petroleum refinery products. Although domestic demand for mineral products was reviving in the CIS, consumption of most mineral products remained far below the levels that had existed prior to the break-up of the Soviet Union and well below the levels of advanced industrialized countries.

In 2001, the CIS remained a major world producer of such nonferrous metals as primary aluminum (15%), alumina (12%), and mined and primary refined copper (9% and 8%, respectively); mercury (metal content of mine output, 17%), titanium (titanium oxide content of mine output, 32%), tungsten (metal content of mine output, 8%), and of such precious metals as palladium (44%), platinum (20%), gold (11%), and silver (8%). With respect to ferrous metals, the CIS had a significant share of the world output of manganese ore (22%), mine output of nickel and refined nickel (24% and 22%, respectively), chromite (17%), iron content of iron ore (26%), and direct-reduced iron and pig iron (12%). The CIS also produced a significant share of the total world production of such selected industrial minerals and fuels such as natural gas (27%), nitrogen (in ammonia, 14%), petroleum (crude, 13%), and phosphate rock (P_2O_5) (9%) potash (K_2O) (34%) sulfur, (15%) and uranium (19%).

Russia, which encompasses about 75% of the territory of the CIS, had the largest mineral industry in Europe and Central Eurasia, which produced a broad range of crude and processed mineral commodities. Kazakhstan and Ukraine followed Russia as regions that had important places in Central Eurasia. Uzbekistan and several countries in the CIS also were important producers and processors of minerals. In 2001, according to data and estimates available for this report, Russia ranked first in the world in the production of asbestos, natural gas, nickel, palladium, and titanium sponge, second in the world in the production of aluminum, platinum, and potash, and among the top five world producers of other mineral commodities, which included mine output of antimony, boron, beryl, and mine output of cobalt, gem and industrial diamond, ferroalloys, gold, iron ore, magnesium metal, crude petroleum, phosphate rock, crude steel, sulfur, and mine output of tungsten.

Kazakhstan was a significant producer of such mineral products as arsenic, beryllium metal, bismuth, cadmium, chromite, copper, ferroalloys, lead, titanium sponge, uranium, and zinc. Ukraine was a significant producer of such mineral products as ferroalloys, iron ore, manganese ore, pig iron, crude steel, and titanium raw materials. Other countries in the CIS were significant world producers of one or more mineral commodities—Azerbaijan (oil), Armenia (molybdenum), Belarus (potash), Kyrgyzstan (antimony metal, mercury ore and metal), Tajikistan (aluminum), Turkmenistan (natural gas), and Uzbekistan (gold, uranium). All countries in the CIS produced a range of other mineral commodities.

The countries of the Caspian Sea region were of great importance to world energy markets because of the large oil and gas reserves in this region that were further developed. These resources have created competition between countries concerning their ownership, among companies to get development rights, and among countries to establish export routes. Proven oil reserves for the entire Caspian Sea region, which were estimated to be between 18 billion and 35 billion barrels (Gbbl), were comparable to those of the United States (22 Gbbl), and greater than those in the North Sea, 17 Gbbl; undiscovered oil resources could yield another 235 Gbbl of oil.

For the oil and gas in the Caspian Sea region to be developed to its full oil and gas potential, the littoral states must first agree on the legal status of the Caspian Sea to settle the issue of the ownership of resources. Negotiations between the littoral states have made slow progress in resolving differences. Consequently, no agreed-upon convention exits that delineates the littoral states' ownership of the Caspian's resources or their development rights. Several conflicts have arisen over claims to regions of the Caspian. Disputes exist concerning whether the resources in the Caspian should be shared in common by all littoral states or if it should be divided into national sectors. Division into national sectors has been the de facto solution, but disputes have arisen over the delineation of these national sectors.

Central Europe and the Balkans, which transect Western Europe and Central Eurasia roughly from the Baltic Sea to the Black Sea and Mediterranean-Adriatic areas, had economies and mineral industries similar in kind, though not in scope, to those of Central Eurasia. With the exception of Poland, which remained a ranking world producer of bituminous coal, copper, salt, silver, and mined sulfur, most countries of Central Europe and the Balkans continued to produce most minerals largely for domestic or local use. In the Balkan area before the 1991, the former Yugoslavia (now the independent republics of Bosnia and Herzegovina, Croatia, Macedonia, Serbia and Montenegro, and Slovenia) was a major European producer of aluminum, copper, lead, and zinc, as well as a broad range of mined and processed metals, industrial minerals, and mineral fuels. The former Yugoslavia also was a major European toll smelter of nonferrous and precious metals. The civil war and ethnic strife, which followed the dissolution of the former Yugoslavia, with the exception of Slovenia, left these countries with damaged and ruined industrial plants and infrastructure and generally depressed economies that greatly diminished investor confidence and interest in them. In 2001, however, the conflicts from ethnic disputes that arose in the Province of Kosovo of Serbia and Montenegro and in Macedonia in 1999 and 2000 appeared to have abated.

Investment Overview

In Western Europe, despite up-to-date mining legislation, deregulation, and tax relief to encourage investment in mineral resource exploration and development, these activities generally have been decreasing. Apart from exploration activities described later, some investment to reevaluate older mining areas appeared to be continuing in 2001.

Apart from denationalization, the need to rationalize and modernize industrial processes to raise their competitiveness and to bring them into compliance with environmental standards was one of the chief aims of the economic transition process in Central Europe and the Balkans and Central Eurasia. Another was the modernization of infrastructure to serve social and commercial interests more efficiently. In Central Europe, these transitional needs presented targets of opportunity for foreign investors. During most of the 1990s and through 2001, strong foreign investor interest in Central Europe and the Balkans was manifested by very high activity in the area's industrial minerals sector, especially its cement plants and associated quarries for calcareous stone, clay, gypsum, and marl. Investment in other branches of the industrial minerals sector was highlighted by activity in Hungary's kaolinite, perlite, and silica mining operations.

By 2001, virtually all Central Europe's cement operations (clinker and grinding) and their quarries had been acquired by Western Europe's (mainly, the EU) leading cement producers and building material manufacturers. The output of these plants met not only the domestic needs of the Central European countries, but also was exported, in many cases, to the foreign owner's home countries in the EU. In the Balkans, this also was the case with respect to Bulgaria, Croatia, Macedonia, and Serbia and Montenegro. Foreign investment activity (mostly from the EU) in 2000 was especially pronounced.

In 2001, Central Europe's iron and steel sector saw investor interest in Poland's, Cedler, Florian, Katowice, and Sendzimir steel mills. The Czech Republic's Trinecke Zelezarny acquired stock in the Nova Hut (Czech Republic) steelworks. In midyear, Italian stainless steel producer Cogne Acciai Speciali Srl acquired Dam-Diogyor Acelmuvek Rt., which was Hungary's stainless and other alloy steel producer.

Foreign investment in base and precious metals in the Balkans involved the acquisition of mine production and processing rights for copper and gold in Albania, Bulgaria, and Romania. Albania also reported foreign investor interest in its chromite mining and ferrochromium-producing operations and in its steel plant at Elbasan. Foreign capital also was channeled for acquisition and modernization of iron and steel plants in Bosnia and Herzegovina; Bulgaria; Macedonia, which included an earlier sale of the ferronickel producer FENI; Romania; and Slovenia.

One of the major investment issues that continued to have significant economic, environmental, and geopolitical ramifications involved the proposed routing of additional pipelines to export hydrocarbons from this region. These host of issues included the degree that Russia should control export routes by having them pass through its territory, the intent of countries to avoid routing pipelines through potentially unfriendly countries such as Iran and Afghanistan, the role of Armenia as a potential transit route owing to its conflict with Azerbaijan, and the potential environmental hazards of routing shipments by pipeline under the Caspian Sea or by tanker through the Bosporus. Such unresolved issues have obstructed the planning and construction of potential export pipelines from the region. A "northern route" that transits more than 128 kilometers (km) through the war-torn Russian republic of Chechnya en route to the Black Sea port of Novorosiisk was being used to transport the first oil production (early oil) from Azerbaijan. A western route was also in use for early oil that passed through Georgia to the Black Sea. A major route that was being considered was the Baku-Ceyhan Pipeline route, which was termed the "Main Export Pipeline" (MEP). The MEP would extend 1,670 km through Azerbaijan, Georgia, and Turkey and transport oil from the Caspian littoral states. The three countries on whose territory the pipeline would be built have affirmed their support for the project, but oil companies, which would finance the construction of the pipeline, would have to agree on the economic feasibility of this project.

Legislation

Contrary to Western Europe where much of the legislation needed to restrict pollution and to stimulate and regulate general commercial and mineral industry operations was firmly in place, the legislative situation in the transitional economy countries remained more fluid during the 1990s. The legislative agendas of the countries of Central Europe and the Balkans and Central Eurasia focused mainly on reducing social tensions that stemmed from denationalization of whole economies while attempting to bring legal and regulatory practices in the area into greater conformity with those of the developed market economy countries of Western Europe, especially as they related to environmental standards, private ownership practice, mining law, and foreign investment rules.

Environmental Issues

Environmental protection continued to be a major issue. Implementation of most environmental laws and regulations had been fully established during the1980s and 1990s in Western Europe, and most industrial enterprises, which included those in the mineral sector, were obligated to meet set standards for effluent discharges into the environment. Meeting these environmental standards was among the major criteria for accession by new member countries into the EU. The environmental situation in Central Europe and the Balkans and Central Eurasia at the start of their transition to market-based economic systems revealed a landscape of highly polluting heavy industries, many of which caused serious health concerns in the area. This was not due to an absence or lack of environmental laws in the transitional economy countries, but mainly owing to very little effort being expended by the former regimes to enforce the existing pollution laws and, in some cases, to correct confusing and sometimes contradictory laws and regulations. Although some evidence pointed to an abatement of discharges of harmful pollutants from the mining and mineral-processing sector during the early 1990s in several Central European and Central Eurasian countries, this was mostly the result of a sharp decline in production during that period. More recently, the new applicants for EU membership from this area have undertaken serious efforts to make major improvements with respect to the regulatory process and enforcement. Environmental concerns in the Czech Republic and Poland, for example, have prevented the development of gold and lead-zinc deposits.

Exploration

Exploration budgets for Asia, Europe, and the CIS as a whole decreased by a relatively modest 11% based upon data reported by the Metals Economics Group (MEG). According to the MEG findings, these regions accounted for 8.7% of the total world exploration budget. Exploration in Europe and Central

Eurasia accounted for 54% of the total outlay in Asia, Europe, and the CIS. Based on data that reflected the number of sites being explored and compiled by the USGS, activity in this region focused on Finland, Romania, and Russia with additional significant exploration activity in Greenland and Italy.

European exploration activity focused in Finland where the Arctic Platinum Partnership recently announced significant platinum-group metal (PGM) resource estimates, and Riddarhyttan Resources AB delineated substantial gold values at the Suurikuusikko project. Base-metal exploration concentrated in Ireland and Sweden, and exploration for gold continued in Bulgaria, Greenland, Romania, and Spain. Many historical mining areas of Europe were being reevaluated by using current technology after gravity surveying led to the recent discovery of the concealed Las Cruces massive sulfide deposit in Spain.

In Russia, exploration focused on the search for diamond, gold, and PGMs. On the Kola Peninsula, PGM resources reportedly totaled about 1,040 metric tons (t) (about 33 million ounces) in the Pana tundra deposit, thus making it one of the world's richest PGM resources. Extensive drilling programs in Russia were ongoing at the Birkachan gold and Verkhotina diamond deposits, but exploration by foreign companies for new deposits in Russia during 2001 was limited.

A new reporting code for mineral industry activities in Europe came into effect in October 2001. The "Code for Reporting of Mineral Resources and Mineral Reserves," which was similar to the one implemented in Canada in 2000, updates the reporting standards used by the Institution of Mining and Metallurgy, the European Federation of Geologists, and the Institute of Geologists of Ireland. It sets out guidelines for public reporting of mineral exploration results, mineral reserves, and mineral resources in Europe, Ireland, and the United Kingdom.

Amendments to the Russian Production Sharing Agreement of 1996 were passed on December 20, 2000. The purpose of these amendments was to introduce a simplified and more stable regime of foreign investment into the Russian natural resource sector.

Production

The data presented below in the commodity overview section was obtained from the summary table in this report and from comparable data and the summary tables in the Minerals Yearbook, volume III (Europe and Central Eurasia), from 1990 to 2001.

A salient aspect to emerge from the data in these tables was the increase of secondary production and/or recovery of nonferrous metals. Although large-scale ferrous scrap collection as an important component of the raw materials matrix has been in circulation for some time, the large-scale recovery of nonferrous metals was a more recent undertaking. The statistics for nonferrous scrap metal recovery, which have become more readily available in recent years, have shown Europe and Central Eurasia to be playing a major world role in this endeavor with Western Europe as the dominant producer of such secondary nonferrous metals as aluminum, copper, lead, tin, and zinc. Despite playing a much lesser role in secondary nonferrous scrap production, Central Europe and the Balkans and Central Eurasia also began to display some results in this endeavor. Russia in particular showed marked increases in the output of secondary copper and lead from 1997 to 2001.

Additionally, this report has initiated the inclusion of an outlook component in the commodity overview section below. The commodity outlook for 2003, 2005, and 2007 was based on reported planned or in-progress changes to net production capacities for selected mineral commodities among those reviewed in this report. The data in tables 4-23 may not be comparable or additive because of rounding differences.

Commodity Overview

Metals

Western Europe.—With a high social and industrial development base but a static demographic picture, Western Europe should continue to rely more on imported ore and concentrates of ferrous and nonferrous metals and less on domestic mining for most metals. An increased use of secondary metals also will reduce reliance on primary raw materials. Most production increases in this area most likely will be associated increased exports stemming from rising demand for Western European-made durables and consumer products outside the area. Domestic consumption should not be expected to rise in the near future.

Central Europe and the Balkans.—In contrast to Western Europe, almost all the countries in this subregion have a significantly lower base of development with respect to markets, industrial efficiency, commercial and social infrastructures, and per capita GDP. The transitional process to market economies, which would be more in accord with those of Western Europe, will continue, and this development will require major upstream inputs of iron and steel and nonferrous metals to modernize the area's industries and infrastructure. Consequently, increasing consumption of these metals was anticipated. This area has local resources of such nonferrous metals as bauxite, copper, lead, and zinc whose output should increase to meet most rising consumption requirements.

Central Europe, however, will continue to rely on imports of iron ore and concentrate from the CIS and EU. Also a drawdown on stocks of iron and steel scrap for domestic consumption should increase to meet the changing profiles of the area's steel industries.

Central Eurasia.—Led by Russia and Kazakhstan, the CIS will remain a major supplier of natural gas and petroleum and most ferrous, nonferrous, and precious metals to the world market for the foreseeable future. As in the case of Central Europe, an increase in domestic consumption of these commodities was anticipated.

Aluminum, Alumina, and Bauxite.—***Production.***—Despite a level of output of bauxite that was only 8% of total world production, Europe and Central Eurasia accounted for about 34% and 24% of total world output of primary aluminum and alumina, respectively. Major and almost equal shares of alumina and primary aluminum were contributed by Western Europe and Central Eurasia. Russia remained Central Eurasia's main producer of primary aluminum by accounting for about 89% of the subregion's production in 2001 (table 3). Western Europe remained the primary producer of secondary aluminum in the region by contributing about 92% of Europe and Central Eurasia's output of secondary aluminum. In 2001, the region as a whole contributed about 36% of total world production of secondary aluminum. Western Europe also showed apparent steady growth with respect to its share in total world recovery of secondary aluminum—28% in 1998, 29% in 1999, 31% in 2000, and 33% in 2001. In contrast to Western Europe, the recovery of secondary aluminum in Central Europe and the Balkans and Central Eurasia continued in the range of 1% to 2% of world output during these years.

Outlook.—On the basis of reported ongoing and planned facility expansion and/or decommissioning, net changes in production capacity for primary and secondary aluminum for the region through 2007 indicate steady potential production increases. Norway was positioned to be a major element in those increases of primary aluminum (table 4). A steady increase of Russia's substantial primary aluminum smelting capacities could enable a production increase of about 9% by 2007, thereby contributing to the region's positive outlook for aluminum production during this period. The region's production of secondary aluminum should remain at about or slightly more than 3 million metric tons (Mt) with Western Europe contributing about 85% of total output between 2002 and 2007 (table 3, 5).

Regional bauxite production should be sufficient to meet the needs of at least one-fourth of the expected output of primary aluminum between 2002 and 2007 (table 3, 6). Imports of alumina and bauxite should continue to be the region's main source of raw materials for aluminum production (table 3).

Copper.—***Production.***—In 2001, mine production of copper in Europe and Central Eurasia amounted to about 15% of total world production. Central Eurasia (Kazakhstan and Russia) and Central Europe (mainly Poland) and the Balkans contributed about 9% and 5%, respectively, of total world production (table 3).

Although Western Europe was only a minor mine producer of copper, the subregion produced a significant share (8.1%) of total world output of primary refined copper. Germany and Belgium remained the largest producers of primary refined copper by accounting for about 30% and 21%, respectively, of total primary refined copper output in Western Europe.

Central Eurasia and Central Europe and the Balkans contributed about 8% and 4%, respectively, of total world production of primary refined copper. Russia and Kazakhstan remained major producers of primary refined copper by contributing about 57% and 37%, respectively, of total primary refined copper production in Central Eurasia. Primary refined copper production in Central Europe and the Balkans remained about the same compared with that of 2000; the subregion's ranking remained about 4% of total world production. Poland, which remained the area's main producer of primary refined copper (84%), saw primary refined copper rise by about 2.6% compared with that of 2000. On balance, however, Kazakhstan, Poland, and Russia were the region's principal copper mining, smelting, and refining areas by accounting for about 83%% of total metal in ore and concentrate and about 55% of total primary refined copper.

In 2001, about 60% of recorded world output of secondary copper was produced in Europe and Central Eurasia. Western Europe produced about 812,000 t of secondary copper (43% of the world total). Germany and Belgium were the main producers of secondary refined copper by accounting for about 46% and 23%, respectively, of the total produced in Western Europe.

Central Eurasia's share of recorded secondary copper recovery amounted to about 13% of the world total. Stricter enforcement of Russian export laws for nonferrous metals (including secondary copper) resulted in more accurate official reporting on secondary copper collection. Secondary copper production in Central Europe and the Balkans appeared to have remained at about the level as that of 2000.

In general, the data used to report the recovery of secondary copper and other metals in Central Europe and the Balkans and Central Eurasia has not been well documented. The data on secondary metals recovery in the tables in this chapter do not reflect the total recovery of secondary metals in the countries of these subregions.

Outlook.—Development and expansion of mine production of copper in Europe and Central Eurasia in conjunction with the reported ongoing and planned mine closures could result in an increase of copper production of more than 200,000 t by 2007. Kazakhstan, Poland, Portugal, and Russia appeared to be positioned to become the mainstays of production growth in their respective subregions. Russia by itself could account for more than 30% of Europe's and Eurasia's total increase of mined copper by 2007.

Although assessments of Russia's copper reserves and resources have been the subjects of debate, recent estimates have varied from 5% to 10% of total world reserves. In 2001, Russia ranked among the top 10 copper mine producing nations in the world. The Noril'sk complex in East Siberia, which was the country's major copper mining enterprise, was seen as the principal vehicle to lead the expansion of mine production of copper by 2007. In 2001, Noril'sk produced more than 70% of Russia's copper. The planned facility expansion at Noril'sk to increase the output of PGMs would increase the output of copper because mining would transition to copper-rich ores with a high PGM content (table 9).

The net changes in refinery production for the region would appear to be stable, given a potential net increase in 2007 of less than 1% compared with that of 2001. This stability, however, would be underpinned by net capacity growth in Central Europe and the Balkans (mainly Poland) and Central Eurasia, where Uzbekistan, Russia, and Kazakhstan could see growth of about 19%, 12%, and 4%, respectively, compared with that of 2001. Western Europe, however, appears set to reduce the output of refined copper by about 10% during this period. Sweden was the only refined copper producer in Western Europe that could register an increase in the output of refined copper (table 10).

Gold.—***Production.***—In 2001, Europe and Central Eurasia's share of the world's output of gold amounted to about 12%, which was comparable to the region's position in 2000. Central Eurasia remained the dominant producing area by accounting for more than 92% of the region's total output of gold; Central Eurasia's output increased by about 13% compared with the output level reached in 2000 (table 3).

Central Eurasia's total output of gold in 2001 amounted to almost 296 t. Russia, Uzbekistan, Kazakhstan, and Kyrgyzstan produced about 153 t, 87 t, 27 t, and 24 t, respectively.

Russia's gold production reached a 10-year high with about a 7% output increase compared with that of 2000. Plans called for lode deposits to generate about 50% of Russia's gold output.

After Russia, Uzbekistan was the second largest producer of gold in Europe and Central Eurasia. Gold was mined primarily at the Muruntau deposit and also recovered from the mine's tailings, which accumulated over the years. The Newmont Mining Corp. of the United States continued to process the tailings as part of a joint venture (50%) with Uzbek governmental and commercial entities.

To a much greater degree, however, Kazakhstan's gold production was a byproduct associated with the country's nonferrous metals industry. After Kazakhstan, Kyrgyzstan was the fourth largest regional producer of gold. The Kumtor deposit ranked 16th in the world in the size of its gold reserves. Kumtor's gold ore was worked by a joint venture with Canada's Cameco Corporation. In 2001, reserves at Kumtor were estimated to be more than 250 t of contained gold.

Central Europe and the Balkans and Western Europe produced much less gold. In 2001, production levels in Central Europe and the Balkans and Western Europe registered a decrease of about 4% and an increase of about 7%, respectively, compared with those of the preceding year.

Outlook.—Central Eurasia led by Russia would continue to be the region's main gold-producing area. By 2007, gold output in Russia, Kazakhstan, and Kyrgyzstan could increase by about 31%, 13%, and 11%, respectively (table 12).

Iron and Steel.—***Iron Ore.***—*Production.*—In 2001, Europe and Central Eurasia's share of world output crude steel, pig iron, and iron ore amounted to about 34%, 30%, and 29%, respectively. Russia and Ukraine were the region's major iron ore producers. Russia's iron ore output in 2001, however, decreased by more than 4.4% to 82.8 Mt compared with that of 2000. Production of iron ore concentrate decreased by 4.2% to 77.7 Mt, and that of pellets, by 9.2% to 27.8 Mt. Russian estimates of its iron ore reserves placed about 27% of the world's reserves of iron ore in its domain. Mining was conducted at 26 iron ore deposits with reserves adequate for 15 to 20 years at the current rate of extraction. Ukraine had about 30 billion metric tons (Gt) of explored iron ore reserves, which was more than 24% of the explored iron ore reserves in Central Eurasia and about 15% of the world's iron ore reserves. Ukraine's iron ore production in 2001 decreased by 2.2% to 54.65 Mt compared with that of 2000 (table 3).

In Central Europe and the Balkans, iron ore output continued on a small scale. In 2001, iron ore production in this area continued to contract as output fell by 13.5% in comparison with the preceding year. Sweden remained the only significant source of iron ore in Western Europe. In 2001, however, Sweden's production of iron ore declined by about 5.5% to 12.8 Mt of contained iron.

Outlook.—Based on ongoing and planned net changes in capacity, clearly suggests that Central Eurasia should continue to be the region's main source of iron ore. The anticipated decline of iron ore production in Central Europe and the Balkans and Western Europe from 2002 through 2007 may be compensated for production growth by as much as 12% and 4% by Ukraine and Russia, respectively. Total output of iron ore (Fe content) in the region could increase by about 7% during this period (table 13).

Steel.—*Production.*—In 2001, Western Europe's and Central Eurasia's (mainly Russia and Ukraine) share of world output of crude steel remained at 19% and 12%, respectively. In Western Europe, Germany continued to be the largest producer of crude steel followed by Italy, France, and Spain. Steel production in all four countries, however, declined compared with their respective output levels in 2000. Decreases ranged from less than 1% to 7.5%; the total decrease for Western Europe was 2.3% (table 3).

Steel production in Central Europe and the Balkans, which constituted about 10% of the region's output, declined by about 3.8%. Despite an output decline of about 16% compared with that of 2000, Poland remained the subregion's largest producer of steel.

Steel production in Central Eurasia was more than 100 Mt, which was an increase of about 1.0% compared with the subregion's total output in 2000. Russia and Ukraine, accounted for about 59% and 33%, respectively, of total steel output.

Steel trade continued to be the major issue that affected the world economy, which included that of the United States. Russia and the EU have been reaching general agreements on steel trade since 1994. Starting in 2002, the quotas for deliveries of Russian steel to the EU will be increased by 28% to more than the 840,000 t Russia was entitled to ship to the EU in 2001. The United States announced in December the beginning of investigations of a number of countries whose steel exports may have been damaging to the U.S. economy; Russia was named. Agreements between the United States and Russia already had limited steel exports to the United States since 1999. The United States declared in March 2002 that for a 3-year period, it would impose duties that ranged from 8% to 40% on a wide variety of types of imported steel from a number of countries, which include Russia.

Outlook.—Based on anticipated net capacity changes in the region's steel industry, data suggest a possible growth could be about 1.0% by 2007 compared with production reached in 2001. The anticipated increase in steel production of about 12% during this period in Central Eurasia should offset a decline of steel production in Western Europe (table 23).

Ferroalloying Materials.—*Production.*—Europe and Central Eurasia remained a major mine producer of such major ferroalloying materials as nickel, manganese, chromite, and accounted for about 25%, 23%, and 22%, respectively, of total world production. As in 2000, the Central Eurasian countries of Kazakhstan, Ukraine, and Russia had the dominant share of the region's mine output of these commodities.

In 2002, Kazakhstan produced more than 2 Mt of chromite, or about 16% of total world output. Minor amounts of chromite (70,000 t) also were produced in Russia's Ural Mountains. In Central Europe and the Balkans, chromite was produced in Albania and Macedonia. Although Macedonia's chromite output historically was minor, Albania was one of the major world producers in the 1980s. Recent production levels, however, have been well below 100,000 t. Finland remained the main producer of chromite in Western Europe and accounted for about 5% of total world production in 2001.

Ukraine continued to be the leading producer of manganese ore in Europe and Central Eurasia and accounted for about 14% of world output. Also, production of manganese was significant in Kazakhstan where ore production increased by almost 24% to more than 1.4 Mt compared with that of 2000. Overall, Central Eurasia contributed about 22% of world production of manganese in 2001.

Russia's production of nickel in ore represented more than 24% of total world production of nickel. The major portion of Russia's nickel output came from Norilsk, which was obtained from complex sulfide ores at Norilsk in Western Siberia and to a lesser degree on the Kola Peninsula near the border with Finland; laterite ores in the Ural Mountains also were mined. Small quantities of mined nickel came from Kazakhstan and Ukraine. In Western Europe, relatively small quantities of nickel were mined in Greece from laterite deposits and a much lesser amount was produced by Finland (table 3).

In 2001, Central Eurasia (Russia) and Western Europe also contributed 22% and 16%, respectively, of total world output of plant nickel.

Outlook.—Most of the prospective growth in the nickel mining sector is expected to come from Russia's Norilsk operations. Russian production could grow by as much as 11% by 2007 compared with output reached in 2001, whereas mine production of nickel was expected to decrease by as much as 11% in Western Europe. Mine output of nickel in Central Europe and the Balkans was expected to begin during this period (table 18).

Lead and Zinc.—***Lead.***—*Production.*—Europe and Central Eurasia's share of world mine output of lead amounted to about 14% in 2001. Western Europe and Central Europe and the Balkans each accounted for about 6% of world mine lead production. Central Eurasia was a relatively minor mine producer of lead whose output had not exceeded 2% of total world production for any year from 1997 to 2001.

Central Europe and the Balkans saw growth of mine lead production buoyed by output increases of about 70%, 7%, and 5% by Bulgaria, Poland, and Romania, respectively. Poland remained a leading regional mine producer of lead; production reached about 122,000 t of lead in ore. In Western Europe, Spain had the highest growth of mine output of lead—23% compared with that of 2000. Sweden remained the subregion's largest producer, although production declined by almost 20% to 86,000 t (table 3).

Outlook.—Based on reported ongoing and planned net changes in the lead and zinc mining sector, an overall decline in mine production of lead in the region appears to be set to continue through 2007 with some in mine output projected for Central Eurasia. Such factors as depletion and greater reliance on secondary sources of lead have played an important role in this trend (table 4).

Europe and Central Eurasia continued to be an important producing region for primary and secondary refined lead. In 2001, the region accounted for about a 30% share of world production of primary refined lead and a 34% share of total world output of secondary refined lead. The region's share of world production of primary and secondary lead appeared to have declined from 33% and 35%, respectively, of world output levels in 2000 (tables 3, 15).

Western Europe accounted for about 19% and 33% of world output of primary and secondary refined lead, respectively. Although data on recovery and use of secondary lead in Central Eurasia is incomplete, the subregion continued to be major producer of primary refined lead. In 2001, Central Eurasia's production of primary lead, which was based entirely on that of Kazakhstan and Russia, amounted to almost 7% of world production. Central Europe and the Balkans constituted about 5% of total world production; secondary lead production, however, also remained at the level of 2000, or 2% of world production.

Stable regional production of primary refined lead is expected to be buoyed by anticipated production increases in the Central Eurasian and Central European and Balkan areas, especially in Kazakhstan (table 15). Also, full political stabilization in the Balkans, especially in the countries that once comprised Yugoslavia, could well result in an outlook revision in favor of greater output by 2007.

The outlook for secondary lead points to stable regional output through 2007 despite the current paucity of information from Central Eurasia on secondary lead recovery and circulation (table 16).

Zinc.—*Production.*—Europe and Central Eurasia's mine output of zinc accounted for about 16% of world production. The production primary zinc metal, however, accounted for about 70% of total world production. Western Europe accounted for about 50% of the world's production of primary zinc metal, and Central Eurasia and Central Europe and the Balkans contributed 12% and 7%, respectively. In 2001, secondary recovery of zinc in Europe and Central Eurasia apparently increased by about 7% compared with the recovery level of 2000. The latest available data indicated the region's total output of secondary zinc to have constituted about 10% of world output (table 27).

Outlook.—The outlook for the region's mine output of zinc appears to be set to increase for most years through 2007 and would account for between 46% and 50% of zinc needed for metal production within the region. The output of refined zinc also appears set to grow in small increments owing mainly to significant production growth that was anticipated through 2007 in Kazakhstan and Russia (table 28).

Mercury.—Western Europe was a major world mine producer of mercury; output in 2001 accounted for about 37% of total world production. Production in Western Europe centered on output in Spain, which accounted for about all Western Europe's production (table 3).

The total output of mercury by Central Eurasia amounted to about 17% of world production. Kyrgyzstan was the main producer of mined mercury in Central Eurasia and accounted for 75% of the subregion's mine production.

Platinum-Group Metals.—***Production.***—As in the case of nickel, Russia's Norilsk complex, which produced about 72 t of palladium and 35 t of platinum in 2001, accounted for virtually all Europe and Central Eurasia's output of PGMs. Insubstantial amounts of platinum and palladium production also were accounted for by Finland, Poland, and Serbia and Montenegro. Russia's production of palladium and platinum represented about 44% and 20%, respectively, of total world mine production in 2001 (table 3). Although platinum has been used more in the manufacture of jewelry and numismatics than palladium, both metals have such major applications in the industrial sector.as catalysts in catalytic converters to reduce automobile emissions. Moreover, platinum may find increasing application as a catalyst in automotive fuel cell technology.

Russia was the world's second largest producer of PGMs after South Africa in 2001 and was the world's largest palladium producer owing to a higher ratio of palladium to platinum in Russian ores than in South African ores. The Russian company MMC Noril'sk Nickel mined more than 90% of the country's PGM output from mixed sulfide ores at its Polar Division deposits at its in East Siberia. An estimated 10 metric tons per year of PGM (mostly platinum) was mined from placer deposits in the Urals, Siberia, and the Russian Far East.

Noril'sk's long-term development strategy appeared oriented towards maximizing PGM production. Although nickel-rich ores at Noril'sk, which are the primary source of PGM, are being depleted, Norilsk's remaining resources of copper-rich and disseminated ores are rich in PGM. Along with developing new ore sources, Noril'sk Nickel continued to develop the capability to recover PGM from abundant pyrrhotite tailings that were accumulated from many years of mining. PGM production is planned to increase between 2000 and 2010.

Outlook.—Official Norisk company production plans though 2015 indicated that Russian production should continue to account for most, if not entirely all, of the region's output of PGM (table 21).

Silver.—***Production.***—Europe and Central Eurasia was an important source of mined silver and accounted for about 18% of world production in 2001; substantial contributions came from Central Eurasia (8%) and Central Europe and the Balkans (7%). The dominant portion of this output was as a byproduct of nonferrous metals processing. Poland and Kazakhstan remained the region's main producers of silver with output reaching 1,190 t and 982 t respectively.

Outlook.—Kazakhstan, Poland, and Russia are expected to remain the major producers of silver in the region. Russia is expected to be the principal contributor to regional growth of silver output through 2007 (table 22).

Tin.—***Production.***—Mine output of tin in Europe and Central Eurasia, which was minor by world standards, amounted to about 3% of total world production. Portugal and Spain in Western Europe and Russia and, to a lesser extent, Kazakhstan in Central Eurasia were the region's main mine producers of tin (table 3).

Despite a large drop in Russian tin production since the dissolution of the Soviet Union, Russia was still ranked among the world's 10 largest tin producers in 2001. Russian companies were also involved in tin development in Kyrgyzstan, which was developing its tin mining industry. The Novosibirsk tin complex, which was a monopoly tin producer, controlled Russia's only major tin smelter and a large share of the country's tin mining enterprises. In 2001, Novosibirsk produced 4,548 t of tin metal, which accounted for the major portion of Russia's tin metal production.

The region's production of secondary tin was significant and accounted for 36% of known world production; Western Europe's share of world secondary tin output amounted to about 34% of known total world output. Western Europe's output of secondary tin showed significant growth compared with its 18% ranking in 1998. Although the production of secondary tin in Central Eurasia was estimated to be 2% of total world output, the actual condition of secondary tin recovery was not known because of a lack of information from this area.

Outlook.—Compared with the region's production of mined tin in 2001, mine output of tin in 2007 is anticipated to recover marginally after a marked decline in Russia in 2002. During this period, Western Europe's mine production of tin is expected to remain stable (table 24).

Primary tin will continue to be produced in Russia with output expected to decrease sharply in 2002 but to remain stable through 2007 (table 25).

Tungsten.—***Production.***—In 2001, the output of tungsten in ore in Europe and Central Eurasia declined by 4.4% to about 5,600 t compared with that of 2000 and represented about 13% of total world mine production. The main producers were, in order of magnitude, Russia, Austria, and Portugal (table 3).

Russia was the region's only major tungsten producer. The tungsten trioxide content of Russian reserves averaged 2.2 times lower than that in deposits under development in other countries. Russian tungsten reserves have been decreasing. Production could be maintained by expanding capacity for mining tungsten ore at existing mining enterprises and by developing reserves at new deposits, which included a number of other small deposits with rich ore. Russian tungsten production was important to the United States because after China, Russia was the largest supplier of imported tungsten materials. In 2000, total imports of tungsten from Russia to the United States were 1,710 t of contained tungsten, but this was 26% less than what Russia supplied the United States in 1999.

Outlook.—Based on ongoing and planned net changes to mining capacity, data suggest a steady decline in production level through 2007 (table 26).

Industrial Minerals

Western Europe.—The production of most major industrial minerals has remained stable during recent years. As in the case of metals, the disposition of production increases more than likely would be directed toward export rather domestic sales.

Central Europe and the Balkans.—Resources of most industrial minerals in the region are adequate to meet anticipated production and consumption increases. Almost all cement manufacturing and associated quarrying activities have been acquired by major EU cement and building materials manufacturers; many of these enterprises have been undergoing modernization to bring them in accord with EU standards.

Central Eurasia.—Resources of most industrial minerals in the region are adequate to meet anticipated production and consumption increases.

Cement.—Europe and Central Eurasia produced about 17% of total world production of cement in 2001. Western Europe accounted for about 12% of total world output of cement; Central Eurasia and Central Europe and Balkans accounted for about 3% and 2% of total world cement production (table 3).

The acquisition of cement plants in Central Europe and the Balkans by major EU cement companies during the preceding 11-year period remained a trend that extended into Central Eurasia. Foreign investors have been acquiring cement-producing and associated assets in Russia and several other Central Eurasian countries with large cement industries.

Diamond.—***Production.***—Europe and Central Eurasia was one of the world's major diamond-producing regions. In 2001, the region accounted for about 20% of world production of natural diamond and about 15% of world synthetic diamond production. Russia, which produced more than 23 million carats of natural diamond, accounted for virtually all the regions production of natural gem and industrial-grade stones (table 3). In 2001, Russia's output of natural diamond was at about the same level of output as that reached in 2000. Within the category of natural diamond, Russia produced about equal amounts of gem- and industrial-grade material (table 11).

Outlook.—Russian diamond output was expected to increase given the anticipated start of production at the Lomonosov field in the Arkhangelsk region in late 2004 and the new development to be undertaken in Yakutia where reserves were being depleted. Mine development work in Yakutia included facility expansion to bring the Internatsionalny underground mine to full capacity, the development of underground mining below the depleted open pits at the Aikhal and Mir and pipes, the development of underground mining at the Udachnaya pipe, and the expansion of ore-processing capacity at the Nyurba Mine.

Nitrogen.—Europe and Central Eurasia's share of world output of nitrogen in ammonia amounted to more than 28% in 2001, which was an increase of about 1.5% compared with its share of world output in 2000. Central Eurasia was the largest producing area with about 14% of world production in 2001. Lesser contributions to world output by Western Europe and Central Europe and the Balkans amounted to about 11% and 4%, respectively.

Phosphate Rock.—***Production.***—Russia continued to be the major producer of phosphate rock in Europe. Russia produced a 96% share of Central Eurasian output, which accounted for about 8% of world production in 2001. Phosphate rock production in other areas of Europe and Central Eurasia was insignificant by contrast with Russian output (table 3).

Russian phosphate production came almost entirely from apatite ore on the Kola Peninsula. More than 3.2 Gt of reserves of apatite ore, which averaged about 14% P_2O_5, was on the Kola Peninsula. The Apatit Production Association on the Kola Peninsula was the country's major producer of phosphate raw material in the form of apatite concentrate, which averaged between 35% and 39% P_2O_5. The Kola Peninsula's production represented more than 90% of the country's phosphate output. Apatite concentrate exports from the Kola Peninsula amounted to more than one-third of total apatite concentrate production. Decreasing levels of ore quality and more complicated mining and hydrological conditions have been increasing at the Kola operation owing to the growing depth of the mines. The Apatite Production Association planned to maintain apatite concentrate production in the range from 9 million to 9.5 million metric tons per year (Mt/yr), which would require attracting investment to maintain existing production capacities and to prepare new horizons for underground mining.

Outlook.—Based on ongoing and planned net changes to phosphate mining capacity, data suggest an overall increase in production through 2007. This increase mainly would reflect anticipated output growth in Russia, as well as some growth in Western Europe (table 20).

Potash.—Europe and Central Eurasia, which was a substantial producer of potash (K_2O equivalent), accounted for 53% of world production in 2001. Central Eurasia was the leading producing region; Belarus and Russia produced almost an equivalent amount of mined potash that amounted to about 34% of world production. Potash output by Western Europe accounted for about 19% of world production; Germany remained the dominant mine producer. Central Europe and Balkans had no appreciable production of potash (table 3).

Salt.—Major production of salt came from Western Europe, which accounted for about 17% of world production in 2001 (table 3). Central Europe and the Balkans, which was led by Poland, accounted for about 4% of world output. With Russia's output having declined by more than 13%, Central Eurasia's ranking as a salt producer also declined to about 2.5% of world output from 3% in 2000.

Sulfur.—Europe and Eurasia's share of world sulfur production amounted to about 29% in 2001. Central Eurasia, which led the region in the production of sulfur from all sources, accounted for about 15% of world output. Western Europe's share of world sulfur production remained at about 11%, and that of Central Europe and the Balkans (led by Poland), at about 4% (table 3). Sulfur production in Central Eurasia mainly was a byproduct of natural gas and oil production. The availability of byproduct sulfur increased as the countries in the region continued to develop hydrocarbon deposits with high sulfur content.

Titanium.—Europe and Central Eurasia's mine production of titanium, which was substantial, accounted for more than 45% of world output in 2001. Ukraine was the major regional producer and accounted for about 32% of world mine output of titanium. Norway also continued to be an important source of titanium and accounted for about 13% of world output (table 3).

Ukraine, which was the only major producer of titanium raw materials in Central Eurasia, produced ilmenite and rutile and continued to supply ores and concentrates to titanium metals producing plants in the CIS.

The Avisma Titanium-Magnesium complex, which was Russia's only titanium sponge producer, was one of the world's largest producers of titanium sponge. In 2001, Russian titanium sponge production represented about 33% of world output.

The AO Ust'-Kamenogorsk Titanium and Magnesium complex was Kazakhstan's only titanium-sponge-producing plant. AO Ust'-Kamenogorsk exported all its titanium sponge outside the CIS. In 2001, sales from AO Ust'-Kamenogorsk, which were reported in local currency, increased by 76.3% compared with those of 2000. Production of titanium sponge in 2001 amounted 14,000 t, or about 14.3% of world output.

The state-owned Zaporizhya Titanium and Magnesium plant, which was Ukraine's only producer of titanium sponge, had an original design capacity to produce about 20,000 t/yr of titanium. The plant exports most of its output outside the CIS. Sponge production in 2001 amounted to 6,000 t.

Mineral Fuels

Western Europe.—With the exception of North Sea hydrocarbon production, Western Europe sources of energy should continue to be based on imports from the Middle East and from the CIS. A resolution of the pipeline issue described in this report would increase imports from within the region in the Caspian oil- and gas-producing areas of the CIS. Major increases of energy consumption in the near term, however, were not anticipated.

Western Europe, with increasingly integrated economies and energy sectors, was the world's second largest energy consumer after the United States. Members of the EU, with the exception of the United Kingdom, were net energy importers. The EC estimated that the EU would have to import 70% of its total energy and up to 90% of its oil in the next 20 to 30 years if no new measures are taken.

EU members possessed only about 0.7% of the world's proven reserves of oil and 2.5% of the world's natural gas reserves. They have, however, 7.3% of proven coal reserves, 16% of the world's capacity for refining crude oil into petroleum products, and 17% of the world's electric-generating capacity. In 2001, they produced about 4% of the world's crude oil, 10% of the world's natural gas, and 7% of the world's coal. The EU has moved to increase the penetration of renewable energy in the European energy mix. In 2001, the European Parliament approved a Renewables Directive that would require the EU to double its renewable share of energy by 2010. The share of total energy consumption met by renewable energy resources would have to increase to 12% in 2010 from the current level of 6%.

Central Europe and the Balkans.—Most of the countries in the region were net importers of energy. Domestic production of brown coal and lignite for electric power generation will be maintained to reduce the cost of imported natural gas and petroleum, which was largely supplied by the CIS. Poland's hard coal industry will continue to modernize and should continue to play an important regional role in the energy field.

Lignite, which was the fuel mainly used to power thermal electric power stations, continued to be an important source of energy in Central Europe and the Balkans. In 2001, Poland remained the area's largest producer of anthracite coal, bituminous coal, and lignite. As of December 31, 2001, Poland's resources of bituminous coal and anthracite coal amounted to about 45.9 Gt and those of lignite, 13.9 Gt.

Central Eurasia.—Russia and other CIS oil and gas producers will continue to be among the major providers of hydrocarbons to the world market. The rate of increases of future deliveries of these commodities to the world market, however, will depend on the resolution of the pipeline issue for their delivery. The area has sufficient resources to meet demand increases in domestic and export markets. Coal was produced in a majority of the countries in the CIS; Kazakhstan, Russia, and Ukraine, were the major coal producers. Kazakhstan's resources were assessed to be between 150 and 160 Gt. In 2001, Kazakhstan announced plans to increase coal production to more than 80 Mt/yr by 2005.

In 2001, Russia's coal production increased to 270 Mt from 257 Mt in 2000. During the past 3 years, production increased as the Russian economy grew and domestic demand for coal increased. The greatest increases in coal output were in the West Siberian Economic Region, specifically in the Kuznets Basin (Kuzbass), where coal production increased by 32.9% and also in the East Siberian Economic Region where coal production increased by 19.8%. Increases were smaller in the Northern (17%) and Far East (4.4%) Economic Regions. In 2001, the Russian coal mining industry added 21.5 Mt of capacity. In 2001, total capacity of the mines and open pits increased to 279 Mt compared with 267.5 Mt in 2000.

In Ukraine, the decrease in coal extraction since independence ended in 1998. By 2000, coal extraction had reached about 82 Mt, and in 2001, extraction was about 84 Mt. Goals were set to stabilize coal extraction at between 85 and 90 Mt/yr. Most of Ukraine's coal was mined in the Donets Basin (Donbas) in the eastern part of the country.

Coal.—***Anthracite.***—*Production.*—Central Eurasia, which was the region's chief producer of anthracite, accounted for about 9% of total world production in 2001, and production by Central Europe and the Balkans was negligible. Europe and Central Eurasia's production of bituminous coal in 2001 amounted to more than 13% of world production; Western Europe accounted for about 3%. Led by Russia, Kazakhstan, and Ukraine, Central Eurasia accounted for more than 8% of world output of bituminous coal. Poland produced about 85% the of total bituminous coal production in Central Europe and Balkans, which accounted for about 3% of world output (table 3).

Outlook.—Although anticipated production of anthracite and bituminous coal should remain considerably less than the regional output levels of 1990 and 1995, steady output by Poland and expected incremental production growth by Russia's anthracite sector should provide stable prospects for the region's coal industry by 2007 (table 7).

Lignite.—*Production.*—Europe and Central Eurasia was the world's dominant producer of lignite, which continued to represent an almost 65% share of world output. Lignite production by Western Europe, Central Europe and the Balkans, and Central Eurasia was 28%, 25%, and 12%, respectively, of world output.

Outlook.—Data based on anticipated net changes to mine output capacities suggest only a slight decline of production in the region through 2007. Lignite should continue to be an important fuel to be used for electric power generation in the region (table 8).

Natural Gas.—***Production.***—Central Eurasia (mainly Russia) held a substantial share of the world's production of natural gas, which amounted to about 27% of the total in 2001; this share has remained virtually unchanged since 1998. Western Europe, however, saw its share of natural gas production decline to 11% in 2000 from about 13% of the world total in 1997. In 2001, however, natural gas production in Western Europe rose by about 13%, but the subregion's share of world production declined to 10%. Central Europe and the Balkans accounted for a much lesser share of world natural gas output; this share has remained below 2% since the 1997 (table 3).

Outlook.—Anticipated increases in production capacity in Central Eurasia will make this subregion a mainstay for natural gas production increases for the entire region through 2007. Russia, which had the world's largest reserves of natural gas, remained the largest natural gas producer and exporter. Given the slight decline in natural gas production in 2001, Russia may well have to develop new production capacities to maintain and increase production. Most of its fields, however, are located in the more remote regions that lack infrastructure and would require much higher levels of investment. In addition, such major world producers of natural gas as Kazakhstan, Turkmenistan, and Uzbekistan also could be major factors in the region's expected rise in output. The rate at which natural gas production increases will largely will depend on near-term investments in pipelines and other infrastructure that would enable the efficient marketing of this product (table 17).

Petroleum.—*Production.*—In 2001, Europe and Central Eurasia accounted for about 22% of world petroleum production. Western Europe's share of world production accounted for about 9% of world petroleum production. Central Eurasia, which was led by Russia (about 11% of world oil production), accounted for about 13% of the world's output of petroleum in 2001; this level of output was an increase of almost 11% compared with Central Eurasia's output in 2000. Petroleum production in Central Europe and the Balkans continued to be less than 1% of total world output (table 3).

Although Central Eurasia's oil production was centered mainly in West Siberia, major new petroleum resources that occur mostly offshore in the Caspian Sea were developed by the littoral states in conjunction with major Western firms.

In 2001, Russia's oil production increased by about 7% to 348 Mt from 324 Mt in 2000. By early 2002, Russia's oil production was expected to surpass Saudi Arabia's for the first time since the Soviet era and made Russia, at least temporarily, the world's leading oil producer. Russia had the world's eighth largest oil reserves with proven oil reserves of 48.6 Gbbl (about 6.6 Gt).

Following Russia, Kazakhstan was the second largest oil-producing country in Central Eurasia. Kazakhstan's proven petroleum reserves were estimated to be 5.4 Gbbl (about 735 Mt). In addition, Kazakhstan's onshore and offshore petroleum resources were estimated to range from 30 to more than 50 Gbbl (about 4.1 to 6.8 Gt); these roughly equal or exceed its proven reserves. Petroleum output increased by more than 12% in 2001 to 39.7 Mt from 35.3 Mt in 2000. Kazakhstan's oil production was expected to reach almost 60 Mt/yr in 2005, almost 100 Mt/yr by 2010, and 125 Mt/yr by 2015.

Azerbaijan's economic development was based on its vast oil and natural gas resources in the Caspian Sea region. Following independence, Azerbaijan's enormous potential reserves in undeveloped offshore Caspian fields attracted international investors, and multinational energy companies began major investments in the country's oil sector. In 2001, Azerbaijan's oil production increased for the fourth straight year. Output rose to 14.9 Mt in 2001 from 14 Mt in 2000.

Outlook.—The anticipated growth of petroleum production in Europe and Central Eurasia would be sustained by production increases of about 33% from 2001 to 2007 in Central Eurasia (table 19). During the same period, the anticipated production growth in Western Europe should amount to only 6%. Central Eurasia should also see its oil production decline slightly during this period.

Uranium.—Europe and Central Eurasia was the major regional source of mined uranium oxide (table 3). This area's share of world output steadily rose to 21% in 2001 from 17% in 1998.

In the CIS, uranium was mined mainly in the Central Asian countries. Russia did not produce enough uranium to meet its consumption requirements and had to consume stockpiled material. It was planning to make up for shortfalls by participating in uranium development projects at home and abroad. Russia planned to increase the capacity of its nuclear reactors by 50% by 2010 and by more than 450% by 2050. Kazakhstan and Uzbekistan are endowed with substantial resources of uranium ore. Uranium mining in Kyrgyzstan ceased in the mid-1980s. The Kara Balta mining and processing enterprise in Kyrgyzstan remained one of the largest uranium-processing plants in the CIS. Uranium mining ceased in Tajikistan in the mid-1980s.

Trade

Mineral commodity trade in transitional economy countries of Central Eurasia and Central Europe and the Balkans showed mixed features. Of the transitional economy countries, the countries of the CIS were the major exporters of extracted and processed mineral commodities. Exports went to countries primarily outside the CIS. Domestic trade, however, was significant for mineral products in which these countries were deficient and that were not saleable on world markets. Mineral commodity trade in Central Europe and the Balkans was largely distinguished by import dependence on natural gas and petroleum, raw materials for iron and steel production, and a variety of nonferrous metal ores. The CIS continued be a significant exporter of many of these commodities, especially hydrocarbons. With respect to nonmineral trade, the CEFTA-member countries of Central Europe and the Balkans were gradually redirecting a substantial portion of their trade toward markets in the EU.

Steel trade in the region was of special importance. The flow of excess steel to Western Europe and other world markets from Central Europe and the Balkans and Central Eurasia was significant. World steel supply was outstripping demand, and much of this surplus production targeted the European market. The top countries that exported material into the EU were, in order of descending tonnage, Russia, Turkey, Poland, the Czech Republic, Ukraine, Slovakia, Brazil, and Bulgaria. These countries accounted for more than 55% of EU imports. Since 1997, imports from countries outside the EU doubled or more than doubled into Italy, Spain, Sweden, and the United Kingdom and rose by about one-half into Germany. Import penetration by countries outside the EU was highest among the major EU markets in Italy, Spain, and the United Kingdom.

During the latter one-half of the 1990s, an array of dumping charges were initiated against many steel-producing countries in Central Eurasia and Central Europe and the Balkans. Between 1995 and 2002, 74 antidumping actions were initiated against Russian ferrous metals exports, of which 33 resulted in sanctions. Other CIS steel-producing countries were experiencing similar problems. According to Russian analysts, the major problem was that Russian steel exports competed primarily based on their low price because they lacked the necessary attributes to compete on quality, which made these exports an easy target for antidumping actions. These analysts did not envision a quick resolution of this problem owing to the overcapacity of steel production in world markets. A longer term solution to facilitate sales on the world and domestic markets would require the restructuring of the Russian steel industry and the continued restructuring of the domestic economy to facilitate growth and an underlying modernization of the country's financial and legal systems

The issue of iron and steep scrap trade was of some concern in the region. During the 1990s the transitional economy countries of Europe and Central Eurasia became a major source of ferrous scrap feedstock for Western Europe, which had been increasingly redirecting its steelmaking operations toward the greater use of electric-arc furnaces (EAFs) to obtain greater savings and environmental dividends. In Central Europe and the Balkans and Central Eurasia, the trend toward using EAFs and continuous casting technology, although nowhere near the levels attained in Western Europe, also had been growing incrementally. Consequently, decreasing supplies of ferrous scrap to Western Europe and rising exports of steel from Central Europe and the Balkans and Central Eurasia had pressed the steel interests in Western Europe to seek a reversal of these trends.

In 2001, the EU and the United States continued to share the largest two-way trade and investment relationship in the world. The U.S. trade deficit with the EU was about $62 billion. U.S. merchandise exports to the EU were more than $158 billion. U.S. merchandise imports from the EU were about $220 billion. In contrast, commercial activity between the United Stets and Central Europe and the Balkans and Central Eurasia remained at levels that were significantly less developed.

Consumption

Consumption of practically all mineral commodities in the transitional economy countries of Europe and Central Eurasia had fallen sharply during the 1990s. To some extent, this linked the future of many of the mineral industries in these countries to a revival of consumption in this region. If demand there were to revive, then many mineral commodities that were not economic to export because of large transport charges could be marketed domestically. Also, a revival of demand would lessen the pressure to export many mineral products, which could reduce some of the dumping charges that were being leveled at many of the transitional economy countries. A revival of domestic demand would result not only in increased domestic consumption, but also in the production of more value-added products from these mineral commodities. If a large portion of the population of the transitional economy countries were to consume minerals at a rate comparable to that of the more developed industrialized economies, then the mineral trade profile of this region would be significantly changed, probably to the economic advantage of some mineral producers in the transitional economy countries and to the disadvantage of some consumers of mineral products in other parts of the world. As would be the case with any major populated region of the world that was raising its mineral consumption to the level of more advanced industrialized countries, the overall demand for the world's mineral resources would increase.

Consumption of minerals in Western Europe has not shown any significant shifts in 2001 or for several preceding years. The area's low population growth and a fully developed industrial base accounted for the steady rate of minerals consumption.

TABLE 1
EUROPE AND CENTRAL EURASIA: OVERVIEW OF POPULATION AND GROSS DOMESTIC PRODUCT IN 2001

	Population		Gross domestic product 1/		
Major areas and economic affiliations	Total	Growth rate 2/	Gross value (billions)	Per capita	Growth rate 2/
Balkans and Central Europe:					
Central European Free Trade Agreement:					
Bulgaria	7,621,337	-1.11	$48	$6,200	4.00
Czech Republic	10,256,760	-0.07	148	14,400	3.40
Hungary	10,075,034	-0.30	121	12,000	3.90
Poland	38,625,478	-0.02	340	8,800	1.50
Romania	22,317,730	-0.21	153	6,800	4.80
Slovakia	5,422,366	0.14	62	11,500	3.00
Slovenia	1,932,917	0.14	31	16,000	4.00
Total or average	96,251,622	-0.20	903	10,814	3.51
Unaffiliated countries:					
Albania	3,544,841	1.06	13	3,000	7.30
Bosnia and Herzegovina	3,964,388	0.76	7	1,800	6.00
Croatia	4,390,751	1.12	36	8,300	4.00
Macedonia	2,054,800	0.41	9	4,400	-4.00
Serbia and Montenegro	10,656,929	-0.12	24	2,300	5.00
Total or average	24,611,709	0.65	89	3,960	3.66
Total or average, Balkans and Central Europe	120,863,331	0.15	992	8,025	3.58
Central Eurasia:					
Commonwealth of Independent States:					
Armenia	3,330,099	-0.15	$11	3,400	9.60
Azerbaijan	7,798,497	0.38	24	3,100	9.90
Belarus	10,335,382	-0.14	85	8,200	4.10
Georgia	4,960,951	-0.55	16	3,100	8.40
Kazakhstan	16,741,519	0.01	98	5,900	12.20
Kyrgyzstan	4,822,166	1.45	14	2,800	5.00
Moldova	4,434,547	0.09	11	2,600	6.10
Russia	144,978,573	-0.33	1,200	8,300	5.20
Tajikistan	6,719,567	2.12	8	1,140	8.30
Turkmenistan	4,688,963	1.84	22	4,700	10.00
Ukraine	48,396,470	-0.72	205	4,200	9.00
Uzbekistan	25,563,441	1.62	62	2,500	3.00
Total or average	282,770,175	0.47	1,756	4,162	7.57
Unaffiliated countries:					
Estonia	1,415,681	-0.52	14	10,000	4.70
Latvia	1,266,515	-0.77	19	7,800	6.30
Lithuania	3,601,138	-0.25	27	7,600	4.80
Total or average	6,283,334	-0.51	60	8,467	5.27
Total or average, Central Eurasia	289,053,509	0.27	1,816	5,023	7.11
Western Europe:					
European Union:					
Austria	8,169,929	0.23	$203	$25,000	1.20
Belgium and Luxembourg	10,696,164	0.15	318	26,693	1.10
Denmark, Faroe Islands, Greenland	5,471,241	0.30	152	28,000	1.10
Finland	5,183,545	0.14	134	25,800	0.60
France	59,765,983	0.35	1,510	24,400	2.10
Germany	83,251,851	0.26	2,174	26,200	0.60
Greece	10,645,343	0.20	190	17,900	3.70
Ireland	3,883,159	1.07	105	27,300	5.60
Italy	57,715,625	0.05	1,402	24,300	1.80
Netherlands	16,067,754	0.53	413	25,800	1.10
Portugal	10,084,245	0.18	174	17,300	1.70
Spain	40,077,100	0.09	757	18,900	2.80
Sweden	8,876,744	0.02	219	24,700	1.60
United Kingdom	59,778,002	0.21	1,470	24,700	2.40
Total or average	379,666,685	0.27	4,758,036	24,071	1.96
European Free Trade Association:					
Iceland	279,384	0.52	7	24,800	4.30
Norway	4,525,116	0.47	139	30,800	1.30
Switzerland	7,301,994	0.24	226	31,100	1.60
Total or average	12,106,494	0.41	372	28,900	2.40
Unaffiliated countries, Malta	397,499	0.73	6	15,000	4.00
Total or average, Western Europe	392,170,678	0.32	4,758,414	24,594	2.14

See footnotes at end of table.

TABLE 1--Continued
EUROPE AND CENTRAL EURASIA: OVERVIEW OF POPULATION AND GROSS DOMESTIC PRODUCT IN 2001

1/ Calculated on the basis of purchasing power parity.
2/ Calculated as percentage change from 2000 to 2001.

Source: U.S. Central Intelligence Agency, 2002, The world factbook 2002: U.S. Central Intelligence Agency, 658 p. Country references are in the respective country chapters in this volume.

TABLE 2
EUROPE AND CENTRAL EURASIA: SELECTED EXPLORATION SITES IN 2001 1/

Location	Type 2/	Site	Commodity	Company	Resource 3/	Exploration 4/
Finland	E	Arctic/Penikat/Portimo	PGM, Au, Cu, Ni	NA	11.3 Moz PGM and Au	Extensive drilling.
Do.	F	Suurikuusikkko	Au	Riddarhyttan Resources AB	1.6 Moz Au	Do.
Greenland	F	Nalunaq	Au	Crew Development Corp.	396,000 oz Au	Feasibility drilling.
Italy	E	Monte Ollasteddu	Au	Gold Mines of Sardinia Ltd.	Data not released	Extensive drilling.
Romania	E	Certej	Au, Ag	European Goldfields Ltd.	2.83 Moz Au	Do.
Do.	F	Rosia Montana	Au, Ag	Gabriel Resources Ltd.	10.5 Moz Au, 54.6 Moz Ag	Feasibility drilling.
Russia	E	Birkachan	Au	Kinross Gold Corp.	Data not released	Extensive drilling.
Do.	F	Pana	PGM	NA	1,040 t PGM	Extensive work program.
Do.	E	Verkhotina	Diamond	Archangel Diamond Corp.	67 million carats diamond	Do.

NA Not available.
1/ Abbreviations used for commodities in this table include the following: Ag--silver, Au--gold, Cu--copper, Ni--nickel, and PGM--platinum-group metals. Abbreviations used for units of measurement include the following: Moz--million troy ounces, oz--troy ounces, and t--metric tons.
2/ E--Active exploration; F--Feasibility work ongoing/completed.
3/ Resources reported where available based on data from various public sources. Data have not been verified by the U.S. Geological Survey.
4/ Sites where extensive (greater than 10,000 meters) drilling or significant (more than $4 million) expenditure have been reported.

Source: Resource data are unverified public information reported in Wilburn, D.R., 2002, Exploration: Mining Engineering, v. 54, no. 5, May, p. 26-36.

TABLE 3
EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2001 1/ 2/

(Thousand metric tons unless otherwise specified)

	Metals													
	Aluminum								Antimony		Chromite		Copper, mine	
	Alumina		Bauxite		Metal: Primary 3/		Metal: Secondary		Mine output (metric tons)	Percentage change 4/	Gross weight	Percentage change 4/	Metal content	Percentage change 4/
Region and/or country	Quantity	Percentage change 4/	Quantity	Percentage change 4/	Quantity	Percentage change 4/	Quantity	Percentage change 4/						
Central Eurasia:														
Armenia	--	--	--	--	--	--	--	--	--	--	--	--	7	--
Azerbaijan	95	-56.2%	--	--	--	--	--	--	--	--	--	--	--	--
Belarus	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Estonia	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Georgia	--	--	--	--	--	--	--	--	--	--	--	--	8	--
Kazakhstan	1,220	0.2%	3,668	-1.7%	--	--	--	--	--	--	2,046	-21.5%	470	9.3%
Kyrgyzstan	--	--	--	--	--	--	--	--	150	--	--	--	--	--
Latvia	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lithuania	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Moldova	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Russia	3,050	7.0%	4,000	-4.8%	3,300	1.7%	--	--	4,500	--	70	-23.9%	620	8.8%
Tajikistan	--	--	--	--	289	-3.7%	--	--	2,500	25.0%	--	--	--	--
Turkmenistan	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ukraine	1,370	0.7%	--	--	121	1.7%	130	0.8%	--	--	--	--	--	--
Uzbekistan	--	--	--	--	--	--	3	50.0%	--	--	--	--	65	--
Total	5,740	1.6%	7,670	-3.3%	3,710	1.3%	133	1.5%	7,150	7.5%	2,120	-21.6%	1,170	8.3%
Share of world total	11.7%	2.2%	5.6%	-5.4%	15.2%	2.1%	1.7%	9.0%	4.7%	-16.0%	16.8%	-10.4%	8.6%	6.3%
Central Europe and Balkans:														
Albania	--	--	--	--	--	--	--	--	--	--	55	-3.5%	--	--
Bosnia and Herzegovina	--	--	75	--	96	6.7%	4	-20.0%	--	--	--	--	--	--
Bulgaria	--	--	--	--	--	--	8	--	--	--	--	--	88	282.6%
Croatia	--	--	--	--	7	--	8	--	--	--	--	--	--	--
Czech Republic	--	--	--	--	--	--	20	-50.0%	--	--	--	--	--	--
Hungary	300	-16.0%	1,000	-4.4%	35	2.9%	50	-9.1%	--	--	--	--	--	--
Macedonia	--	--	--	--	--	--	4	-20.0%	--	--	5	--	9	-10.0%
Poland	--	--	--	--	55	17.0%	--	-100.0%	--	--	--	--	545	3.8%
Romania	319	-23.5%	--	--	182	1.7%	1	-50.0%	--	--	--	--	19	18.8%
Serbia and Montenegro	201	8.1%	610	-3.2%	100	13.6%	--	--	--	--	--	--	22	-57.7%
Slovakia	110	--	--	--	134	-2.2%	--	--	--	--	--	--	--	--
Slovenia	--	--	--	--	77	-8.3%	--	--	--	--	--	--	--	--
Total	930	-13.1%	1,690	-3.8%	686	3.0%	95	-24.6%	--	--	60	5.3%	683	9.1%
Share of world total	1.9%	-12.6%	1.2%	-5.9%	2.8%	3.8%	1.2%	-19.0%	--	--	0.5%	20.3%	5.0%	7.0%
Western Europe:														
European Free Trade Association:														
Iceland	--	--	--	--	**243**	**8.5%**	--	--	--	--	--	--	--	--
Norway	--	--	--	--	**1,068**	**4.1%**	**265**	**1.9%**	--	--	--	--	--	--
Switzerland	--	--	--	--	**36**	--	**6**	**-60.0%**	--	--	--	--	--	--
Total	--	--	--	--	**1350**	**4.7%**	**271**	**-1.5%**	--	--	--	--	--	--

See footnotes at end of table.

TABLE 3--Continued

EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2001 1/ 2/

(Thousand metric tons unless otherwise specified)

	Metals													
	Aluminum								Antimony		Chromite		Copper, mine	
	Alumina		Bauxite		Metal									
					Primary 3/		Secondary							
Region and/or country	Quantity	Percentage change 4/	Quantity	Percentage change 4/	Quantity	Percentage change 4/	Quantity	Percentage change 4/	Mine output (metric tons)	Percentage change 4/	Gross weight	Percentage change 4/	Metal content	Percentage change 4/
Western Europe--Continued:														
European Union:														
Austria	--	--	--	--	--	--	150	-5.1%	--	--	--	--	--	--
Belgium	--	--	--	--	--	--	1	--	--	--	--	--	--	--
Denmark and Greenland	--	--	--	--	--	--	16	--	--	--	--	--	--	--
Finland	--	--	--	--	--	--	43	--	--	--	575	-8.7%	12	--
France	500	--	153	--	462	4.8%	253	-2.7%	--	--	--	--	--	--
Germany	600	--	--	--	652	1.2%	620	8.4%	--	--	--	--	--	--
Greece	660	-1.0%	1,990	-1.0%	168	-1.0%	3	--	--	--	12	--	--	--
Ireland	1,200	--	--	--	--	--	--	--	--	--	--	--	--	--
Italy	950	--	--	--	187	-1.6%	575	1.2%	--	--	--	--	--	--
Luxembourg	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Malta	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Netherlands	--	--	--	--	294	-2.3%	115	9.5%	--	--	--	--	--	--
Portugal	--	--	--	--	--	--	--	--	--	--	--	--	83	9.2%
Spain	1,100	-8.3%	--	-8.3%	376	2.7%	222	-7.9%	--	--	--	--	10	-56.5%
Sweden	--	--	--	--	102	1.0%	26	--	--	--	--	--	74	-5.1%
United Kingdom	100	--	--	--	341	11.8%	238	-16.5%	--	--	--	--	--	--
Total	5,110	-2.1%	2,140	-2.1%	2,580	2.6%	2,260	-0.7%	--	--	587	-8.6%	179	-5.3%
Total Western Europe	5,110	-2.1%	2,140	-2.1%	3,930	3.3%	2,530	-0.8%	--	--	587	-8.6%	179	-5.3%
Share of world total	10.4%	-1.5%	1.6%	-1.5%	16.1%	4.2%	32.8%	6.5%		--	4.7%	4.5%	1.3%	-7.1%
Total Europe and Central Eurasia	11,800	-1.3%	11,500	-1.3%	8,330	2.4%	2,760	-1.7%	7,150	7.5%	2,770	-18.7%	2,030	7.2%
Share of world total	24.1%	-0.7%	8.3%	-0.7%	34.1%	3.2%	35.8%	5.5%	4.7%	-16.0%	22.0%	-7.1%	14.9%	5.2%
United States	4,340	-9.2%	NA	-9.2%	2,640	-28.1%	2,980	-13.6%	--	--	--	--	1,340	-8.8%
Share of world total	8.9%	-8.6%	NA	-8.6%	10.8%	-27.5%	38.6%	-7.2%	--	--	--	--	9.9%	-10.6%
World total	49,000	-0.6%	138,000	-0.6%	24,400	-0.8%	7,720	-6.9%	151,000	28.0%	12,600	-12.5%	13,600	1.9%

See footnotes at end of table.

TABLE 3--Continued
EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2001 1/ 2/

(Thousand metric tons unless otherwise specified)

	Metals--Continued											
	Copper, refined						Iron and steel					
	Primary 3/		Secondary		Gold, mine output		Iron ore, mine output		Pig iron and direct-reduced iron		Steel, crude	
Region and/or country	Metal content	Percentage change 4/	Quantity	Percentage change 4/	Quantity (kilograms)	Percentage change 4/	Metal content	Percentage change 4/	Quantity	Percentage change 4/	Quantity	Percentage change 4/
Central Eurasia:												
Armenia	--	--	--	--	400	--	--	--	--	--	--	--
Azerbaijan	--	--	--	--	--	--	NA	NA	--	--	--	--
Belarus	--	--	--	--	--	--	--	--	--	--	1,852	14.1%
Estonia	--	--	--	--	--	--	--	--	--	--	--	--
Georgia	--	--	--	--	2,000	-31.6%	--	--	--	--	50	--
Kazakhstan	422	6.8%	--	--	27,100	-3.8%	14,140	-12.5%	3,911	-2.2%	4,694	-1.6%
Kyrgyzstan	--	--	--	--	24,000	9.1%	--	--	--	--	--	--
Latvia	--	--	--	--	--	--	--	--	--	--	500	--
Lithuania	--	--	--	--	--	--	--	--	--	--	--	--
Moldova	--	--	--	--	--	--	--	--	--	--	966	6.3%
Russia	650	1.6%	245	22.5%	152,500	6.6%	82,800	-4.4%	44,980	0.8%	59,000	-0.2%
Tajikistan	--	--	--	--	2,700	--	--	--	--	--	--	--
Turkmenistan	--	--	--	--	--	--	--	--	--	--	--	--
Ukraine	--	--	--	--	--	--	54,650	-2.2%	26,400	2.7%	33,110	4.2%
Uzbekistan	75	--	5	--	87,000	39.7%	--	--	--	--	460	9.5%
Total	1,150	3.3%	250	22.0%	296,000	13.1%	152,000	-4.5%	75,300	1.3%	101,000	1.5%
Share of world total	8.3%	-2.7%	0.0%	25.8%	11.4%	11.3%	26.3%	-4.1%	12.1%	-0.3%	11.9%	0.8%
Central Europe and Balkans:												
Albania	--	--	--	--	--	--	--	--	--	--	94	44.6%
Bosnia and Herzegovina	--	--	--	--	--	--	36	--	60	5.3%	80	3.9%
Bulgaria	28	3.7%	6	20.0%	2,540	8.2%	92	-48.3%	1,000	-16.7%	1,942	-4.0%
Croatia	--	--	--	--	--	--	--	--	--	--	58	-18.3%
Czech Republic	--	--	18	-10.0%	--	--	6	--	6,316	36.7%	6,316	1.6%
Hungary	12	--	--	--	--	--	--	--	1,300	-3.0%	2,056	4.4%
Macedonia	--	--	--	--	--	--	1	--	--	--	--	--
Poland	478	2.6%	20	--	349	-4.9%	--	--	5,540	-14.7%	8,809	-16.1%
Romania	19	18.8%	4	--	3,500	--	63	14.5%	3,235	5.5%	4,930	5.5%
Serbia and Montenegro	32	-30.4%	30	-25.0%	800	-28.6%	--	--	461	-18.1%	598	-12.3%
Slovakia	2	--	--	--	157	-48.7%	300	--	3,255	2.8%	3,989	6.9%
Slovenia	--	--	--	--	--	--	--	--	--	--	500	-3.7%
Total	571	0.4%	78	-10.3%	7,350	-3.9%	498	-13.5%	21,200	3.2%	29,400	-3.8%
Share of world total	4.1%	-5.5%	0.0%	-7.5%	0.3%	-5.3%	0.1%	-13.2%	3.4%	1.6%	3.5%	-4.5%
Western Europe:												
European Free Trade Association:												
Iceland	--	--	--	--	--	--	--	--	--	--	--	--
Norway	27	--	--	--	--	--	340	-7.9%	60	1.6%	630	1.6%
Switzerland	--	--	--	--	--	--	--	--	100	5.3%	1,200	5.3%
Total	27	--	--	--	--	--	340	-7.9%	160	4.0%	1,830	4.0%

See footnotes at end of table.

TABLE 3--Continued

EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2001 1/ 2/

(Thousand metric tons unless otherwise specified)

	Metals--Continued											
	Copper, refined				Gold, mine output		Iron and steel					
	Primary 3/		Secondary				Iron ore, mine output		Pig iron and direct-reduced iron		Steel, crude	
Region and/or country	Metal content	Percentage change 4/	Quantity	Percentage change 4/	Quantity (kilograms)	Percentage change 4/	Metal content	Percentage change 4/	Quantity	Percentage change 4/	Quantity	Percentage change 4/
Western Europe--Continued:												
European Union:												
Austria	1	-50.0%	68	-12.8%	--	--	575	15.0%	4,200	-2.7%	5,700	-0.4%
Belgium	236	--	189	1.1%	--	--	--	--	8,500	0.3%	12,000	3.1%
Denmark and Greenland	--	--	--	--	--	--	--	--	--	--	760	1.3%
Finland	100	--	16	14.3%	5,600	12.0%	--	--	3,000	0.6%	4,100	0.1%
France	--	--	2	--	2,510	-4.6%	--	--	12,004	-12.1%	19,431	-7.5%
Germany	334	-0.3%	375	--	--	--	--	--	29,184	-5.4%	44,775	-3.5%
Greece	--	--	--	--	--	--	600	4.3%	--	--	1,000	-8.1%
Ireland	--	--	--	--	--	--	--	--	--	--	150	-58.3%
Italy	--	--	36	-50.7%	503	--	--	--	11,000	-2.0%	26,000	-1.7%
Luxembourg	--	--	--	--	--	--	--	--	--	--	2,570	-0.04%
Malta	--	--	--	--	--	--	--	--	--	--	--	--
Netherlands	--	--	--	--	--	--	--	--	5,000	0.6%	5,700	0.6%
Portugal	--	--	--	--	--	--	11	-8.3%	360	-5.8%	900	-18.0%
Spain	235	-8.9%	56	-3.4%	3,720	--	--	--	4,094	0.9%	15,834	-0.1%
Sweden	179	70.5%	25	--	4,986	39.7%	12,811	-5.5%	3,614	14.9%	5,450	4.3%
United Kingdom	--	-100.0%	45	-8.2%	--	--	(5/)	--	10,000	-9.0%	15,000	-2.0%
Total	1,090	4.6%	812	-5.7%	17,300	-4.9%	14,000	-4.4%	91,000	-4.3%	159,000	-2.3%
Total Western Europe	1,120	4.5%	812	-5.7%	17,300	-4.9%	14,300	-4.5%	91,200	-4.3%	161,000	-2.3%
Share of world total	8.1%	-1.5%	42.7%	-2.7%	0.7%	-6.3%	2.5%	-4.2%	14.7%	-5.8%	18.9%	-3.0%
Total Europe and Central Eurasia	2,840	3.2%	1,140	-1.1%	321,000	11.5%	167,000	-4.5%	188,000	-1.3%	291,000	-1.2%
Share of world total	20.6%	-2.8%	60.0%	2.0%	12.4%	9.8%	28.9%	-4.2%	30.2%	-2.9%	34.2%	-1.9%
United States	1,630	2.5%	172	-17.3%	335,000	-5.1%	29,300	-26.2%	43,300	-12.3%	90,100	-11.7%
Share of world total	11.8%	-3.4%	9.1%	-14.7%	12.9%	-6.6%	5.1%	-25.9%	7.0%	-13.8%	10.6%	-12.3%
World total	13,800	6.2%	1,900	-3.1%	2,590,000	1.6%	578,000	-0.3%	622,000	1.6%	852,000	0.7%

See footnotes at end of table.

TABLE 3--Continued
EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2001 1/ 2/

(Thousand metric tons unless otherwise specified)

	Metals--Continued													
	Lead						Manganese ore, mine output		Mercury, mine output		Nickel			
	Mine		Refined								Mine		Refined	
			Primary 3/		Secondary									
Region and/or country	Metal content	Percentage change 4/	Quantity	Percentage change 4/	Quantity	Percentage change 4/	Metal content	Percentage change 4/	Metal content (metric tons)	Percentage change 4/	Metal content	Percentage change 4/	Quantity	Percentage change 4/
Central Eurasia:														
Armenia	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Azerbaijan	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Belarus	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Estonia	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Georgia	(5/)	--	--	--	--	--	70	18.6%	--	--	--	--	--	--
Kazakhstan	38	--	159	-14.5%	--	--	1,403	23.5%	--	--	3	--	--	--
Kyrgyzstan	--	--	--	--	--	--	--	--	270	--	--	--	--	--
Latvia	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lithuania	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Moldova	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Russia	12	-7.7%	68	15.3%	--	--	23	--	50	--	325	3.2%	252	1.6%
Tajikistan	1	--	--	--	--	--	--	--	40	--	--	--	--	--
Turkmenistan	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ukraine	--	--	--	--	12	-20.0%	2,700	-1.5%	NA	--	2	--	--	--
Uzbekistan	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	51	-1.9%	227	-7.3%	12	-20.0%	4,200	3.6%	360	3.6%	330	4.1%	252	1.6%
Share of world total	1.6%	-5.3%	6.5%	-13.5%	0.4%	-16.0%	22.0%	9.5%	16.8%	9.5%	24.4%	-3.6%	11.8%	-1.9%
Central Europe and Balkans:														
Albania	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bosnia and Herzegovina	(5/)	--	(5/)	--	--	--	2	--	--	--	--	--	--	--
Bulgaria	17	21.4%	89	27.1%	--	-100.0%	2	100.0%	--	--	--	--	--	--
Croatia	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Czech Republic	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hungary	--	--	--	--	--	--	43	4.9%	--	--	--	--	--	--
Macedonia	11	-57.7%	7	-68.2%	--	--	--	--	--	--	--	--	--	--
Poland	122	7.0%	66	88.6%	--	-100.0%	--	--	--	--	--	--	--	--
Romania	20	5.3%	24	-4.0%	3	--	70	191.7%	--	--	--	--	--	--
Serbia and Montenegro	19	-26.9%	--	-100.0%	--	--	--	--	--	--	--	--	--	--
Slovakia	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Slovenia	--	--	--	--	15	--	--	--	--	--	--	--	--	--
Total	189	-5.0%	186	21.6%	18	-73.5%	117	74.6%	--	--	--	--	--	--
Share of world total	5.9%	-8.3%	5.3%	13.6%	0.6%	-72.3%	0.6%	84.7%	--	--	--	--	--	--
Western Europe:														
European Free Trade Association:														
Iceland	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Norway	--	--	--	--	--	--	--	--	--	--	3	--	68	15.3%
Switzerland	--	--	--	--	10	--	--	--	--	--	--	--	--	--
Total	--	--	--	--	10	--	--	--	--	--	3	--	68	15.3%

See footnotes at end of table.

TABLE 3--Continued

EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2001 1/ 2/

(Thousand metric tons unless otherwise specified)

	Metals--Continued													
	Lead						Manganese ore, mine output		Mercury, mine output		Nickel			
	Mine		Refined								Mine		Refined	
			Primary 3/		Secondary									
Region and/or country	Metal content	Percentage change 4/	Quantity	Percentage change 4/	Quantity	Percentage change 4/	Metal content	Percentage change 4/	Metal content (metric tons)	Percentage change 4/	Metal content	Percentage change 4/	Quantity	Percentage change 4/
Western Europe--Continued:														
European Union:														
Austria	--	--	--	--	22	-8.3%	--	--	--	--	--	--	--	--
Belgium	--	--	80	-18.4%	16	-20.0%	--	--	--	--	--	--	--	--
Denmark and Greenland	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Finland	--	--	--	--	--	--	--	--	--	-100.0%	2	-33.3%	55	7.8%
France	--	--	98	-2.0%	143	-9.5%	--	--	--	--	--	--	13	30.0%
Germany	--	--	154	-27.0%	220	7.8%	--	--	--	--	--	--	--	--
Greece	28	55.6%	--	--	5	100.0%	10	--	--	--	20	100.0%	17	--
Ireland	45	-22.4%	--	--	13	44.4%	--	--	--	--	--	--	--	--
Italy	1	-50.0%	82	9.3%	121	-24.4%	1	--	--	--	--	--	--	--
Luxembourg	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Malta	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Netherlands	--	--	--	--	24	9.1%	--	--	--	--	--	--	--	--
Portugal	--	--	--	--	4	-20.0%	--	--	--	--	--	--	--	--
Spain	50	25.0%	--	--	122	1.7%	--	--	800	-11.1%	--	--	--	--
Sweden	86	-19.6%	31	--	44	-6.4%	--	--	--	--	--	--	--	--
United Kingdom	1	--	203	22.3%	163	-4.7%	--	--	--	--	--	--	37	-2.6%
Total	211	-6.6%	648	-4.8%	897	-4.6%	11	--	800	-15.3%	22	633.3%	122	5.2%
Total Western Europe	211	-6.6%	648	-4.8%	907	-4.5%	11	--	800	-15.3%	25	316.7%	190	8.6%
Share of world total	6.6%	-9.8%	18.6%	-11.1%	32.5%	0.3%	0.1%	--	37.4%	-11.4%	1.9%	285.8%	8.9%	4.8%
Total Europe and Central Eurasia	451	-5.5%	1,061	-1.7%	937	-9.3%	4,328	4.7%	1,160	-10.2%	355	9.9%	442	4.5%
Share of world total	14.0%	-8.7%	30.4%	-8.1%	33.6%	-4.7%	22.7%	10.8%	54.2%	-6.0%	26.3%	1.8%	20.7%	0.9%
United States	466	-0.4%	290	-15.0%	1,100	-2.7%	--	--	NA	NA	--	--	--	--
Share of world total	14.5%	-3.8%	8.3%	-20.6%	39.4%	2.2%	--	--	NA	NA	--	--	--	--
World total	3,210	--	3,490	7.1%	2,790	-4.8%	19,100	-5.4%	2,140	-4.5%	1,350	8.0%	2,140	3.6%

See footnotes at end of table.

TABLE 3--Continued
EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2001 1/ 2/

(Thousand metric tons unless otherwise specified)

	Metals--Continued											
							Tin					
	Platinum-group metals						Mine output		Refined			
	Palladium		Platinum		Silver, mine output		Metal content		Primary 3/		Secondary	
Region and/or country	Quantity (metric tons)	Percentage change 4/	Quantity (metric tons)	Percentage change 4/	Quantity (metric tons)	Percentage change 4/	(metric tons)	Percentage change 4/	Quantity (metric tons)	Percentage change 4/	Quantity (metric tons)	Percentage change 4/
Central Eurasia:												
Armenia	--	--	--	--	1	--	--	--	--	--	--	--
Azerbaijan	--	--	--	--	--	--	--	--	--	--	--	--
Belarus	--	--	--	--	--	--	--	--	--	--	--	--
Estonia	--	--	--	--	--	--	--	--	--	--	--	--
Georgia	--	--	--	--	33	-2.9%	--	--	--	--	--	--
Kazakhstan	--	--	--	--	982	5.9%	23	-89.5%	--	--	--	--
Kyrgyzstan	--	--	--	--	--	--	300	100.0%	--	--	--	--
Latvia	--	--	--	--	--	--	--	--	--	--	--	--
Lithuania	--	--	--	--	--	--	--	--	--	--	--	--
Moldova	--	--	--	--	--	--	--	--	--	--	--	--
Russia	72	-14.3%	35	--	380	2.7%	4,500	-10.0%	4,600	-2.1%	500	--
Tajikistan	--	--	--	--	5	--	--	--	--	--	--	--
Turkmenistan	--	--	--	--	--	--	--	--	--	--	--	--
Ukraine	--	--	--	--	--	--	--	--	--	--	--	--
Uzbekistan	--	--	--	--	80	-11.1%	--	--	--	--	--	--
Total	72	-14.3%	35	--	1,480	3.8%	4,820	-7.6%	4,600	-2.1%	500	--
Share of world total	44.4%	-7.9%	21.6%	-12.4%	7.9%	1.6%	2.1%	-3.1%	1.7%	-5.4%	2.1%	6.8%
Central Europe and Balkans:												
Albania	--	--	--	--	--	--	--	--	--	--	--	--
Bosnia and Herzegovina	--	--	--	--	--	--	--	--	--	--	--	--
Bulgaria	--	--	--	--	57	3.6%	--	--	--	--	10	--
Croatia	--	--	--	--	--	--	--	--	--	--	--	--
Czech Republic	--	--	--	--	--	--	--	--	--	--	--	--
Hungary	--	--	--	--	--	--	--	--	--	--	--	--
Macedonia	--	--	--	--	15	-25.0%	--	--	--	--	--	--
Poland	(5/)	--	(5/)	--	1,190	4.0%	--	--	--	--	--	--
Romania	--	--	--	--	18	--	--	--	--	--	--	--
Serbia and Montenegro	(5/)	--	(5/)	--	6	-33.3%	--	--	--	--	--	--
Slovakia	--	--	--	--	--	--	--	--	--	--	--	--
Slovenia	--	--	--	--	--	--	--	--	--	--	--	--
Total	(5/)	--	(5/)	--	1,290	3.2%	--	--	--	--	10	--
Share of world total	--	--	--	--	6.9%	1.0%	--	--	--	--	(7/)	--
Western Europe:												
European Free Trade Association:												
Iceland	--	--	--	--	--	--	--	--	--	--	--	--
Norway	--	--	--	--	--	--	--	--	--	--	--	--
Switzerland	--	--	--	--	--	--	--	--	--	--	--	--
Total	--	--	--	--	--	--	--	--	--	--	--	--

See footnotes at end of table.

TABLE 3--Continued
EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2001 1/ 2/

(Thousand metric tons unless otherwise specified)

	Metals--Continued											
	Platinum-group metals						Tin					
							Mine output		Refined			
	Palladium		Platinum		Silver, mine output				Primary 3/		Secondary	
Region and/or country	Quantity (metric tons)	Percentage change 4/	Quantity (metric tons)	Percentage change 4/	Quantity (metric tons)	Percentage change 4/	Metal content (metric tons)	Percentage change 4/	Quantity (metric tons)	Percentage change 4/	Quantity (metric tons)	Percentage change 4/
Western Europe--Continued:												
European Union:												
Austria	--	--	--	--	--	--	--	--	--	--	--	--
Belgium	--	--	--	--	--	--	--	--	--	--	8,000	-5.9%
Denmark and Greenland	--	--	--	--	--	--	--	--	--	--	--	--
Finland	(5/)	--	(5/)	--	24	--	--	--	--	--	--	--
France	--	--	--	--	1	--	--	--	--	--	2	100.0%
Germany	--	--	--	--	--	--	--	--	--	--	--	--
Greece	--	--	--	--	62	67.6%	--	--	--	--	--	--
Ireland	--	--	--	--	23	-8.0%	--	--	--	--	--	--
Italy	--	--	--	--	4	--	--	--	--	--	--	--
Luxembourg	--	--	--	--	--	--	--	--	--	--	--	--
Malta	--	--	--	--	--	--	--	--	--	--	--	--
Netherlands	--	--	--	--	--	--	--	--	--	--	--	--
Portugal	--	--	--	--	23	15.0%	1,201	20.1%	--	--	--	--
Spain	--	--	--	--	60	-27.7%	1,000	-50.0%	--	--	--	--
Sweden	--	--	--	--	306	-7.0%	--	--	--	--	--	--
United Kingdom	--	--	--	--	--	--	--	--	--	--	--	--
Total	(5/)	--	(5/)	--	503	-3.8%	2,200	-26.6%	--	--	8,000	-5.9%
Total Western Europe	(5/)	--	(5/)	--	503	-3.8%	2,200	-26.6%	--	--	8,000	-5.9%
Share of world total	--	--	--	--	2.7%	-5.9%	1.0%	-97.7%	--	--	34.2%	0.6%
Total Europe and Central Eurasia	72	-14.3%	35	--	3,270	--	7,020	-14.5%	4,600	-2.1%	8,000	-5.5%
Share of world total	44.4%	-7.9%	21.6%	-12.4%	17.5%	0.1%	3.1%	-10.4%	1.7%	-5.4%	34.2%	0.9%
United States	12	20.0%	12	33.3%	1,740	-6.5%	--	--	--	--	13,900	-7.9%
Share of world total	7.4%	28.9%	7.4%	16.8%	9.3%	-8.5%	--	--	--	--	59.4%	-1.7%
World total	162	-6.9%	162	14.2%	18,700	2.2%	227,000	-4.6%	267,000	3.5%	23,400	-6.4%

See footnotes at end of table.

TABLE 3--Continued
EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2001 1/ 2/

(Thousand metric tons unless otherwise specified)

	Metals--Continued										Industrial minerals			
	Titanium				Zinc									
							Refined							
	Mine output		Tungsten, mine output		Mine		Primary 3/		Secondary		Ammonia, N content		Cement, hydraulic	
Region and/or country	TiO2 content 6/	Metal, sponge	W content (metric tons)	Percentage change 4/	Quantity	Percentage change 4/	Quantity	Percentage change 4/	Quantity	Percentage change 4/	Quantity	Percentage change 4/	Quantity	Percentage change 4/
Central Eurasia:														
Armenia	--	--	--	--	--	-100.0%	--	--	--	--	--	--	276	26.0%
Azerbaijan	--	--	--	--	--	--	--	--	--	--	--	--	500	150.0%
Belarus	--	--	--	--	--	--	--	--	--	--	725	-0.7%	1,803	-2.4%
Estonia	--	--	--	--	--	--	--	--	--	--	135	5.5%	405	23.1%
Georgia	--	--	--	--	--	--	--	--	--	--	60	-55.6%	300	-13.8%
Kazakhstan	--	--	--	--	(5/)	--	--	--	--	--	--	--	1,957	66.6%
Kyrgyzstan	--	14	--	--	344	5.8%	277	5.7%	--	--	--	--	500	--
Latvia	--	--	100	--	--	--	--	--	--	--	--	--	W	NA
Lithuania	--	--	--	--	--	--	--	--	--	--	540	5.9%	529	-7.2%
Moldova	--	--	--	--	--	--	--	--	--	--	--	--	200	-9.9%
Russia	--	23	3,600	2.9%	124	-8.8%	237	3.0%	--	--	8,685	-0.6%	35,100	8.3%
Tajikistan	--	--	--	--	--	--	--	--	--	--	10	--	70	40.0%
Turkmenistan	--	--	--	--	--	--	--	--	--	--	75	--	NA	NA
Ukraine	309	6	--	--	--	--	--	--	--	--	3,700	3.4%	5,500	3.6%
Uzbekistan	--	--	--	--	--	--	20	11.1%	--	--	670	-17.3%	4,000	13.6%
Total	309	43	3,700	5.7%	468	1.3%	534	4.7%	--	--	14,600	-0.7%	51,140	8.5%
Share of world total	5.0%	43.9%	8.4%	-9.7%	5.2%	-1.7%	12.1%	2.6%	--	--	13.8%	2.1%	3.0%	4.7%
Central Europe and Balkans:														
Albania	--	--	--	--	--	--	--	--	--	--	--	--	150	16.7%
Bosnia and Herzegovina	--	--	--	--	(5/)	--	(5/)	--	(5/)	--	2	--	300	--
Bulgaria	--	--	--	--	11	10.0%	89	6.0%	--	--	600	-7.3%	2,200	-0.4%
Croatia	--	--	--	--	--	--	--	--	--	--	263	-19.8%	3,246	13.8%
Czech Republic	--	--	--	--	--	--	--	--	(5/)	--	250	--	3,550	-13.3%
Hungary	--	--	--	--	--	--	--	--	--	--	250	--	3,500	4.2%
Macedonia	--	--	--	--	5	-58.3%	16	-64.4%	--	--	--	--	450	-23.1%
Poland	--	--	--	--	153	-15.9%	164	1.9%	--	--	1,169	-3.2%	12,074	-19.8%
Romania	--	--	--	--	30	11.1%	47	-9.6%	--	--	1,000	-3.2%	5,668	-6.4%
Serbia and Montenegro	--	--	--	--	20	-31.0%	13	62.5%	--	--	66	10.0%	2,418	14.2%
Slovakia	--	--	--	--	--	--	--	--	--	--	209	-2.8%	3,123	2.6%
Slovenia	--	--	--	--	--	--	--	--	--	--	--	--	1,300	--
Total	--	--	--	--	219	-15.8%	329	-6.0%	(5/)	--	3,810	-4.6%	38,000	-7.7%
Share of world total	--	--	--	--	2.4%	-18.3%	7.4%	-7.9%	--	--	3.6%	-1.9%	2.2%	-10.9%
Western Europe:														
European Free Trade Association:														
Iceland	--	--	--	--	--	--	--	--	--	--	3			-57.1%
Norway	265	--	--	--	--	--	129	2.4%	--	--	323			-3.3%
Switzerland	--	--	--	--	--	--	--	--	--	--	32			-3.0%
Total	265	--	--	--	--	--	129	2.4%	--	--	358			-4.3%

See footnotes at end of table.

TABLE 3--Continued

EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2001 1/ 2/

(Thousand metric tons unless otherwise specified)

	Metals--Continued										Industrial minerals			
					Zinc									
	Titanium						Refined							
	Mine output,		Tungsten, mine output		Mine		Primary 3/		Secondary		Ammonia, N content		Cement, hydraulic	
Region and/or country	TiO2 content 6/	Metal, sponge	W content (metric tons)	Percentage change 4/	Quantity	Percentage change 4/	Quantity	Percentage change 4/	Quantity	Percentage change 4/	Quantity	Percentage change 4/	Quantity	Percentage change 4/
Western Europe--Continued:														
European Union:														
Austria	--	--	1,237	-22.7%	--	--	--	--	--	--	400	-11.1%	3,800	--
Belgium	--	--	--	--	--	--	230	2.7%	30	7.1%	1,700	-2.9%	8,000	--
Denmark and Greenland	--	--	--	--	--	--	--	--	--	--	2	--	2,010	(7/)
Finland	--	--	--	--	36	125.0%	247	10.8%	--	--	6	--	1,500	5.4%
France	--	--	--	--	--	--	344	-1.7%	--	--	1,580	-2.5%	20,559	1.8%
Germany	--	--	--	--	--	--	358	0.3%	--	--	2,522	2.0%	30,989	-12.0%
Greece	--	--	--	--	20	--	--	--	--	--	120	-0.8%	14,000	-3.4%
Ireland	--	--	--	--	225	-14.4%	--	--	--	--	400	-2.4%	2,000	--
Italy	--	--	--	--	--	--	178	4.7%	--	--	434	6.4%	39,885	2.2%
Luxembourg	--	--	--	--	--	--	--	--	--	--	--	--	600	--
Malta	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Netherlands	--	--	--	--	--	--	205	-4.7%	--	--	2,500	-1.6%	3,200	--
Portugal	--	--	698	-6.1%	--	--	4	--	--	--	250	1.6%	9,200	--
Spain	--	--	--	--	309	-22.2%	437	13.2%	--	--	436	-1.4%	40,520	6.2%
Sweden	--	--	--	--	156	-11.9%	--	--	--	--	--	--	2,600	-1.9%
United Kingdom	--	--	--	--	--	--	100	--	--	--	850	4.4%	12,103	-4.7%
Total	--	--	1,940	-17.4%	746	-14.5%	2,100	3.6%	30	7.1%	11,200	-0.7%	191,000	-0.9%
Total Western Europe	265	--	1,940	-17.4%	746	-14.5%	2,230	3.6%	30	7.1%	11,600	-0.8%	191,000	-0.8%
Share of world total	4.3%	--	4.4%	-29.5%	8.3%	-17.1%	50.3%	1.5%	9.8%	21.5%	10.9%	2.0%	11.2%	-4.3%
Total Europe and Central Eurasia	574	43	5,640	-3.6%	1,430	-10.2%	3,090	2.7%	30	7.1%	30,000	-1.3%	280,100	-0.3%
Share of world total	9.3%	43.9%	12.9%	-17.7%	15.9%	-12.9%	69.8%	0.6%	9.8%	21.5%	28.3%	1.5%	16.5%	-3.8%
United States	500	--	--	--	842	1.6%	203	-11.0%	108	-24.5%	9,730	-20.9%	90,400	1.0%
Share of world total	8.1%	--	--	--	9.4%	-1.5%	4.6%	-12.8%	35.2%	-14.4%	9.2%	-18.7%	5.3%	-2.6%
World total	6,190	98	43,800	17.1%	9,000	3.1%	4,430	2.1%	307	-11.8%	106,000	-2.8%	1,700,000	3.7%

See footnotes at end of table.

TABLE 3--Continued
EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2001 1/ 2/

(Thousand metric tons unless otherwise specified)

	Industrial minerals--Continued												Mineral fuels	
	Diamond				Phosphate rock		Potash, K2O equivalent		Salt		Sulfur, all forms		Coal, anthracite	
	Natural 8/		Synthetic											
Region and/or country	Quantity	Percentage change 4/	Quantity	Percentage change 4/	Gross quantity	Percentage change 4/	Quantity	Percentage change 4/	Quantity	Percentage change 4/	Quantity	Percentage change 4/	Quantity	Percentage change 4/
Central Eurasia:														
Armenia	--	--	--	--	--	--	--	--	29	-3.3%	--	--	--	--
Azerbaijan	--	--	--	--	--	--	--	--	4	--	--	--	--	--
Belarus	--	--	--	--	--	--	4,495	18.7%	301	-3.2%	20	--	--	--
Estonia	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Georgia	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Kazakhstan	--	--	--	--	97	193.9%	--	--	--	--	1,700	13.3%	--	--
Kyrgyzstan	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Latvia	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lithuania	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Moldova	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Russia	23,000	-0.9%	80,000	--	10,500	-5.4%	4,300	16.2%	2,800	-12.5%	6,250	5.9%	14,000	-8.6%
Tajikistan	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Turkmenistan	--	--	--	--	--	--	--	--	215	--	9	--	--	--
Ukraine	--	--	8,000	--	--	--	75	-11.8%	2,300	0.6%	80	--	18,000	1.4%
Uzbekistan	--	--	--	--	300	--	--	--	--	--	460	3.4%	--	--
Total	23,000	-0.9%	88,000	--	10,900	-4.7%	8,870	17.2%	5,650	-6.6%	8,520	7.1%	32,000	-3.2%
Share of world total	19.7%	(7/)	14.3%	-19.5%	8.7%	0.6%	34.1%	14.5%	2.5%	-11.1%	14.9%	6.9%	9.3%	-9.4%
Central Europe and Balkans:														
Albania	--	--	--	--	--	--	--	--	--	--	1	--	--	--
Bosnia and Herzegovina	--	--	--	--	--	--	--	--	50	--	1	--	--	--
Bulgaria	--	--	--	--	--	--	--	--	1,931	13.6%	600	--	14	-6.7%
Croatia	--	--	--	--	--	--	--	--	33	-2.9%	15	--	--	--
Czech Republic	--	--	--	--	--	--	--	--	--	--	40	--	--	--
Hungary	--	--	--	--	--	--	--	--	--	--	30	--	--	--
Macedonia	--	--	--	--	--	--	--	--	--	--	20	23.1%	--	--
Poland	--	--	--	--	--	--	--	--	4,330	0.5%	1,085	-37.4%	268	0.4%
Romania	--	--	--	--	--	--	--	--	2,224	-3.6%	202	-3.8%	--	--
Serbia and Montenegro	--	--	--	--	--	--	--	--	62	-20.5%	101	--	--	--
Slovakia	--	--	--	--	--	--	--	--	123	0.8%	--	--	--	--
Slovenia	--	--	--	--	--	--	--	--	2	-60.0%	--	--	--	--
Total	--	--	--	--	--	--	--	--	8,760	1.8%	2,100	-24.0%	282	--
Share of world total	--	--	--	--	--	--	--	--	3.9%	-3.2%	3.7%	-24.2%	0.1%	-6.4%
Western Europe:														
European Free Trade Association:														
Iceland	--	--	--	--	--	--	--	--	5	25.0%	--		--	--
Norway	--	--	--	--	--	--	--	--	--	--	123		--	--
Switzerland	--	--	--	--	--	--	--	--	300	--	3		NA	NA
Total	--	--	--	--	--	--	--	--	305	0.3%	126		NA	NA

See footnotes at end of table.

TABLE 3--Continued
EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2001 1/ 2/

(Thousand metric tons unless otherwise specified)

	Industrial minerals--Continued												Mineral fuels	
	Diamond				Phosphate rock		Potash, K2O equivalent		Salt		Sulfur, all forms		Coal, anthracite	
	Natural 8/		Synthetic											
Region and/or country	Quantity	Percentage change 4/	Quantity	Percentage change 4/	Gross quantity	Percentage change 4/	Quantity	Percentage change 4/	Quantity	Percentage change 4/	Quantity	Percentage change 4/	Quantity	Percentage change 4/
Western Europe--Continued:														
European Union:														
Austria	--	--	--	--	--	--	--	--	401	--	15	66.7%	194	-26.2%
Belgium	--	--	--	--	--	--	--	--	--	--	410	--	2,573	-23.5%
Denmark and Greenland	--	--	--	--	--	--	--	--	605	--	11	--	--	--
Finland	--	--	--	--	750	--	--	--	--	--	795	-6.5%	--	--
France	--	--	3,600	--	--	--	257	-19.9%	7,100	-0.3%	1,100	--	--	--
Germany	--	--	--	--	--	--	3,550	4.2%	9,005	-3.5%	1,240	0.8%	--	--
Greece	--	--	--	--	--	--	--	--	180	--	72	-7.7%	--	--
Ireland	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Italy	--	--	--	--	--	--	--	--	3,800	--	700	1.0%	--	--
Luxembourg	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Malta	--	--	--	--	--	--	--	--	5,000	--	--	--	--	--
Netherlands	--	--	--	--	--	--	--	--	580	-0.9%	510	-0.4%	--	--
Portugal	--	--	--	--	--	--	--	--	4,100	6.0%	28	-6.7%	--	--
Spain	--	--	--	--	--	--	569	-11.9%	--	--	667	-5.8%	3,130	-29.8%
Sweden	--	--	--	--	--	--	--	--	--	--	207	36.2%	--	--
United Kingdom	--	--	--	--	--	--	532	-11.3%	6,100	3.4%	192	0.5%	2,655	--
Total	--	--	3,600	--	750	--	4,910	-1.3%	36,900	0.2%	5,950	-0.5%	8,550	-20.4%
Total Western Europe	--	--	3,600	--	750	--	4,910	-1.3%	37,200	0.2%	6,080	-0.2%	8,550	-20.4%
Share of world total	--	--	0.6%	-19.5%	0.6%	5.6%	18.9%	-3.6%	16.5%	-4.7%	10.6%	-0.4%	2.5%	-25.5%
Total Europe and Central Eurasia	23,000	-0.9%	91,600	--	11,700	-4.4%	13,800	9.8%	51,600	-0.3%	16,700	-0.7%	40,800	-7.4%
Share of world total	19.7%	(7/)	14.9%	-19.5%	9.3%	0.9%	53.1%	7.3%	22.9%	-5.2%	29.1%	-0.8%	11.9%	-13.3%
United States	--	--	308,000	24.2%	31,900	-17.4%	1,200	-7.7%	44,800	-1.8%	9,250	-10.2%	3,500	-15.7%
Share of world total	--	--	50.2%	--	25.3%	-12.8%	4.6%	-9.8%	19.9%	-6.6%	16.1%	-10.4%	1.0%	-21.1%
World total	117,000	-0.8%	614,000	24.2%	126,000	-5.3%	26,000	2.4%	225,000	5.1%	57,300	0.2%	343,000	6.9%

See footnotes at end of table.

TABLE 3--Continued
EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2001 1/ 2/

(Thousand metric tons unless otherwise specified)

	Mineral fuels--Continued									
	Coal--Continued				Natural gas, marketed		Petroleum, crude			
	Bituminous		Lignite						Uranium, U_3O_8 content	
Region and/or country	Quantity	Percentage change 4/	Quantity	Percentage change 4/	Quantity (million cubic meters)	Percentage change 4/	Quantity (thousand 42-gallon barrels)	Percentage change 4/	Quantity (metric tons)	Percentage change 4/
Central Eurasia:										
Armenia	--	--	--	--	--	--	--	--	NA	NA
Azerbaijan	--	--	--	--	5,500	--	109,515	7.1%	--	--
Belarus	--	--	--	--	300	16.7%	13,965	3.4%	--	--
Estonia	--	--	--	--	--	--	--	--	--	--
Georgia	4	-42.9%	--	--	(5/)	--	735	0.7%	--	--
Kazakhstan	77,000	10.3%	2,500	2.3%	11,600	0.5%	291,995	12.5%	2,380	16.0%
Kyrgyzstan	200	92.3%	277	-13.7%	30	-6.3%	550	-24.7%	--	--
Latvia	--	--	--	--	--	--	--	--	--	--
Lithuania	--	--	--	--	--	--	1,677	-23.2%	NA	NA
Moldova	--	--	--	--	--	--	--	--	--	--
Russia	156,000	3.9%	100,000	13.9%	581,000	-0.5%	2,558,000	8.2%	2,359	--
Tajikistan	20	--	--	--	50	25.0%	150	14.5%	--	--
Turkmenistan	--	--	--	--	46,300	-1.5%	58,065	12.3%	--	--
Ukraine	65,000	3.1%	900	-15.7%	18,300	2.5%	27,195	0.2%	590	--
Uzbekistan	200	189.9%	2,800	12.0%	56,400	1.4%	55,125	65.3%	2,830	2.1%
Total	298,000	5.4%	106,000	13.1%	719,000	0.1%	3,120,000	9.1%	8,160	5.0%
Share of world total	8.3%	-1.3%	11.6%	3.1%	26.7%	-1.8%	13.1%	13.7%	19.0%	0.1%
Central Europe and Balkans:										
Albania	--	--	16	-50.0%	11	-99.8%	2,172	5.2%	--	--
Bosnia and Herzegovina	--	-100.0%	1,900	-64.4%	--	--	--	--	--	--
Bulgaria	101	-97.0%	27,007	2.6%	22	46.7%	235	-24.4%	--	--
Croatia	--	--	--	--	2,009	13.6%	8,308	-5.2%	--	--
Czech Republic	17,500	-73.0%	51,000	-0.1%	115	-2.5%	1,085	-50.5%	389	-34.1%
Hungary	573	-8.3%	13,427	4.3%	3,280	-2.1%	7,000	-29.0%	--	-100.0%
Macedonia	--	--	6,000	-20.2%	--	--	--	--	--	--
Poland	103,992	2.0%	59,557	0.1%	5,175	4.4%	5,704	21.1%	--	--
Romania	14	-95.0%	32,731	12.8%	14,090	-3.5%	47,450	8.0%	136	130.5%
Serbia and Montenegro	70	-23.9%	32,165	-6.1%	111	-30.6%	5,533	-5.3%	--	--
Slovakia	--	--	3,424	-6.1%	212	100.0%	365	--	NA	NA
Slovenia	--	-100.0%	3,448	-7.9%	6	-14.3%	(5/)	--	NA	NA
Total	122,000	-30.3%	231,000	-1.6%	25,000	-18.5%	77,900	-0.3%	525	-20.6%
Share of world total	3.4%	-34.7%	25.4%	-10.3%	0.9%	-20.1%	0.3%	3.9%	1.2%	-24.2%
Western Europe:										
European Free Trade Association:										
Iceland	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**
Norway	**320**	**-49.4%**	**--**	**--**	**41,000**	**-2.4%**	**1,137,882**	**-2.5%**	**--**	**--**
Switzerland	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**NA**	**NA**
Total	**320**	**-49.4%**	**--**	**--**	**41,000**	**-2.4%**	**1,140,000**	**-2.5%**	**NA**	**NA**

See footnotes at end of table.

TABLE 3--Continued

EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2001 1/ 2/

(Thousand metric tons unless otherwise specified)

	Mineral fuels--Continued									
	Coal--Continued				Natural gas, marketed		Petroleum, crude		Uranium, U3O8 content	
	Bituminous		Lignite							
Region and/or country	Quantity	Percentage change 4/	Quantity	Percentage change 4/	Quantity (million cubic meters)	Percentage change 4/	Quantity (thousand 42-gallon barrels)	Percentage change 4/	Quantity (metric tons)	Percentage change 4/
Western Europe--Continued:										
European Union:										
Austria	--	--	1,206	-3.4%	1,800	50.0%	7,000	0.9%	--	--
Belgium	--	-100.0%	--	--	--	--	--	--	--	--
Denmark and Greenland	--	--	--	--	9,700	36.6%	88,130	-33.5%	--	--
Finland	--	--	--	--	--	--	--	--	NA	NA
France	2,170	-26.1%	324	9.5%	1,810	-66.0%	10,082	-4.8%	146	-61.2%
Germany	24,788	-25.6%	175,364	4.6%	22,000	4.8%	23,603	1.3%	24	-27.3%
Greece	--	--	67,575	5.8%	--	--	1,822	5.1%	--	--
Ireland	--	--	--	--	2,500	--	--	--	--	--
Italy	--	--	14	--	18,000	-2.7%	35,000	6.5%	--	--
Luxembourg	--	--	--	--	--	--	--	--	--	--
Malta	--	--	--	--	--	--	--	--	--	--
Netherlands	--	--	--	--	74,000	8.8%	18,000	71.3%	NA	NA
Portugal	--	--	--	--	--	--	--	--	5	-58.3%
Spain	7,361	-29.8%	12,193	43.0%	180	0.6%	2,505	44.5%	35	-88.2%
Sweden	--	--	--	--	--	--	--	--	NA	NA
United Kingdom	29,473	5.5%	--	--	96,000	37.1%	820,845	-1.1%	NA	NA
Total	63,800	-15.0%	256,700	6.2%	226,000	16.6%	1,010,000	-4.1%	210	-70.7%
Total Western Europe	64,100	-15.3%	256,700	6.2%	267,000	13.2%	2,150,000	-3.3%	210	-70.7%
Share of world total	1.8%	-20.7%	28.2%	-3.2%	9.9%	11.1%	9.0%	0.8%	0.5%	-72.1%
Total Europe and Central Eurasia	484,000	-9.2%	594,000	4.1%	1,010,000	2.7%	5,350,000	3.7%	8,900	-2.8%
Share of world total	13.4%	-15.0%	65.2%	-5.1%	37.5%	0.7%	22.4%	8.0%	20.7%	-7.3%
United States	938,000	5.2%	76,100	-1.9%	578,000	2.1%	2,120,000	--	1,180	-31.4%
Share of world total	26.0%	-1.5%	8.4%	-10.7%	21.5%	0.2%	8.9%	4.2%	2.8%	-34.6%
World total	3,610,000	6.8%	911,000	9.8%	2,690,000	1.9%	23,900,000	-4.0%	42,900	4.8%

NA Not available. W Withheld to avoid disclosing proprietary data; not included in region and world totals. -- Zero.

1/ Some of the individual entries in this table may differ from those appearing in individual country production tables elsewhere in this volume owing to the inclusion in this table of data received at a later date.

2/ Table includes data available as of March 19, 2004.

3/ Primary production also includes undifferentiated (primary and secondary) production for those listed.

4/ Percentage change is calculated for each region and/or country by taking 100 times the difference of the current year's data over last year's data minus 100.

5/ Less than 1/2 unit.

6/ Includes, ilmenite, leucoxene, rutile, and titaniferous slag.

7/ Less than 0.05 percent.

8/ Includes gem and industrial diamonds.

TABLE 4
EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED PRODUCTION OF PRIMARY ALUMINUM 1/

(Metric tons)

	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Balkans and Central Europe:								
Bosnia and Herzegovina	89,000	15,000	90,000	96,000	100,000	110,000	110,000	110,000
Croatia	74,037	30,944	7,000	7,000	--	--	--	--
Hungary	105,162	29,000	34,000	35,000	85,000	85,000	90,000	90,000
Poland	46,000	56,000	47,000	55,000	51,000	51,000	53,000	53,000
Romania	178,000	144,000	179,000	182,000	190,000	190,000	190,000	190,000
Slovakia	30,100	38,100	137,000	134,000	150,000	150,000	160,000	160,000
Slovenia	99,500	57,700	84,000	77,000	88,000	90,000	90,000	90,000
Yugoslavia	81,000	17,000	88,000	100,000	110,000	120,000	120,000	120,000
Total	703,000	388,000	666,000	686,000	770,000	780,000	800,000	800,000
Central Eurasia:								
Azerbaijan	50,000	27,000	--	--	--	10,000	20,000	40,000
Kazakhstan	--	--	--	--	--	--	--	30,000
Russia	2,700,000	2,724,000	3,245,000	3,300,000	3,400,000	3,500,000	3,600,000	3,700,000
Tajikistan	450,000	230,000	300,000	289,000	310,000	320,000	330,000	340,000
Ukraine	100,000	98,000	119,000	121,000	110,000	110,000	120,000	130,000
Total	3,300,000	3,080,000	3,660,000	3,710,000	3,800,000	3,900,000	4,100,000	4,200,000
Western Europe:								
France	325,000	366,000	441,000	462,000	460,000	460,000	450,000	450,000
Germany	720,000	575,000	644,000	652,000	650,000	650,000	650,000	600,000
Greece	149,000	144,000	168,000	168,000	160,000	170,000	160,000	150,000
Iceland	87,000	100,100	224,000	243,000	260,000	280,000	300,000	320,000
Italy	232,000	178,000	190,000	187,000	190,000	200,000	190,000	180,000
Netherlands	269,000	216,000	301,000	294,000	280,000	280,000	280,000	250,000
Norway	894,000	902,500	1,026,000	1,068,000	1,400,000	1,400,000	1,400,000	1,500,000
Spain	353,000	362,000	366,000	376,000	380,000	380,000	380,000	350,000
Sweden	126,300	117,500	101,000	102,000	130,000	130,000	130,000	140,000
Switzerland	72,000	21,000	36,000	36,000	36,000	36,000	36,000	36,000
United Kingdom	294,000	238,000	305,000	341,000	340,000	330,000	330,000	300,000
Total	3,520,000	3,220,000	3,800,000	3,930,000	4,300,000	4,300,000	4,300,000	4,200,000
Grand total	7,520,000	6,690,000	8,130,000	8,330,000	8,800,000	9,000,000	9,200,000	9,300,000

e/ Estimated; estimated data are rounded to no more than two significant digits; may not add to totals shown. -- Zero.

1/ Totals are rounded to no more than three significant digits.

TABLE 5
EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED PRODUCTION OF SECONDARY ALUMINUM 1/

(Thousand metric tons)

	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Balkans and Central Europe:								
Bosnia and Herzegovina	10	10	5	4	5	5	5	5
Bulgaria	5	5	8	8	8	8	8	8
Croatia	NA	NA	15	16	--	15	15	15
Czech Republic	--	48	40	20	20	20	20	20
Hungary	30	4	65	50	50	50	50	50
Macedonia	5	4	5	4	5	5	5	--
Poland	--	5	6	10	10	10	10	10
Romania	10	3	--	--	2	2	2	2
Slovakia	--	--	--	--	--	--	--	--
Slovenia	--	--	--	--	--	--	--	--
Yugoslavia	NA	NA	NA	NA	NA	NA	NA	NA
Total	60	79	144	112	100	120	120	110
Central Eurasia: 2/								
Russia	NA	75	125	125	130	130	150	180
Ukraine	NA	98	129	130	130	130	130	130
Uzbekistan	NA	3	2	3	3	3	3	3
Total	NA	176	256	258	260	260	280	310
Western Europe								
Austria	36	94	158	150	150	150	150	150
Belgium	7	4	1	1	1	1	1	1
Denmark and Greenland	11	35	16	16	18	20	20	18
Finland	24	35	45	34	34	33	32	32
France	208	231	260	253	260	270	270	270
Germany	590	531	572	620	660	650	650	650
Greece	3	3	3	3	2	2	2	2
Iceland	--	--	--	--	--	--	--	--
Ireland	--	--	--	--	--	--	--	--
Italy	350	412	568	575	590	600	600	600
Netherlands	134	192	119	120	120	120	120	120
Norway	49	56	260	265	270	260	260	260
Portugal	NA	NA	18	18	16	16	16	16
Spain	63	107	241	222	240	240	240	240
Sweden	30	23	26	26	28	30	32	32
Switzerland	34	11	15	6	6	6	6	6
United Kingdom	121	282	285	238	210	230	230	230
Total	1,660	2,020	2,570	2,550	2,600	2,600	2,600	2,600
Grand total	1,720	2,270	2,970	2,920	3,000	3,000	3,000	3,000

e/ Estimated; estimated data are rounded to no more than two significant digits; may not add to totals shown. -- Zero.

1/ Totals are rounded to no more than three significant digits.

2/ Information about the amount of secondary alumiunm collected and processed in the other member countries of the Commonwealth of Independent States at present is lacking

TABLE 6

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED PRODUCTION OF BAUXITE 1/

(Metric tons)

	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Balkans and Central Europe:								
Bosnia and Herzegovina	1,703,000	75,000	75,000	75,000	100,000	100,000	100,000	100,000
Croatia	309,109	1,500	--	--	--	--	--	--
Hungary	2,559,000	1,015,000	1,046,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
Romania	242,800	175,000	--	--	--	--	--	--
Yugoslavia	940,000	60,000	630,000	610,000	610,000	650,000	700,000	800,000
Total	5,750,000	1,330,000	1,750,000	1,690,000	1,700,000	1,800,000	1,800,000	1,900,000
Central Eurasia:								
Kazakhstan	3,000,000	3,071,000	3,730,000	3,668,000	3,700,000	3,700,000	3,700,000	3,700,000
Russia	4,000,000	4,000,000	4,200,000	4,000,000	4,000,000	4,400,000	5,000,000	6,000,000
Total	7,000,000	7,070,000	7,930,000	7,670,000	7,700,000	8,100,000	8,700,000	9,700,000
Western Europe:								
France	490,000	75,000	185,000	153,000	160,000	160,000	150,000	150,000
Greece	2,486,000	2,200,000	1,991,000	1,990,000	2,500,000	2,300,000	2,200,000	2,000,000
Total	2,976,000	2,275,000	2,176,000	2,143,000	2,700,000	2,500,000	2,400,000	2,200,000
Grand total	15,700,000	10,700,000	11,900,000	11,500,000	12,000,000	12,000,000	13,000,000	14,000,000

e/ Estimated; estimated data are rounded to no more than two significant digits; may not add to totals shown. -- Zero.

1/ Totals are rounded to no more than three significant digits.

TABLE 7

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED PRODUCTION OF ANTHRACITE AND BITUMINOUS COAL 1/

(Thousand metric tons)

	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Balkans and Central Europe:								
Bulgaria	143	194	118	122	120	110	110	100
Czech Republic	30,714	21,309	17,028	17,500	18,000	17,000	17,000	17,000
Hungary	1,736	844	744	573	660	650	650	600
Poland	147,624	137,166	103,331	103,992	100,000	100,000	110,000	110,000
Romania	4,447	1,149	3,251	14	13	10	10	10
Serbia and Montenegro	137	57	88	70	70	40	40	40
Total	185,000	185,000	185,000	185,000	120,000	120,000	120,000	120,000
Central Eurasia:								
Georgia	70	40	7	4	6	6	6	6
Kazakhstan	130,000	80,000	70,000	76,500	71,000	71,000	80,000	95,000
Kyrgyzstan	1,700	250	200	200	200	200	200	200
Russia	257,000	177,000	173,000	170,000	170,000	180,000	180,000	200,000
Ukraine	135,000	83,000	80,000	83,000	81,000	80,000	75,000	70,000
Uzbekistan	200	200	200	200	200	200	200	200
Total	524,000	340,000	323,000	330,000	320,000	330,000	340,000	370,000
Western Europe:								
France	10,488	7,014	3,805	2,364	2,100	1,800	1,000	750
Gemany	70,158	52,408	34,251	27,361	25,000	22,000	20,000	18,000
Norway	358	343	330	320	310	300	300	300
Spain	19,557	17,700	10,824	10,491	9,900	9,600	8,000	4,000
Sweden	11	--	--	--	--	--	--	--
United Kingdom	94,397	53,037	31,972	32,128	30,000	28,000	26,000	22,000
Total	195,000	131,000	81,200	72,700	67,000	62,000	55,000	45,000
Grand total	904,000	632,000	529,000	525,000	510,000	510,000	510,000	530,000

e/ Estimated; estimated data are rounded to no more than two significant digits; may not add to totals shown. -- Zero.

1/ Totals are rounded to no more than three significant digits.

TABLE 8
EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED PRODUCTION OF LIGNITE 1/

(Thousand metric tons)

	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Balkans and Central Europe:								
Albania	2,071	81	21	16	20	20	25	25
Bulgaria	31,532	30,636	26,976	27,007	26,000	25,000	25,000	25,000
Bosnia and Herzegovina	18,157	1,808	1,900	1,900	2,000	3,000	4,000	4,000
Czech Republic	80,205	58,773	51,063	51,000	49,000	50,000	50,000	50,000
Hungary	15,842	13,601	13,532	13,427	12,000	12,000	12,000	12,000
Macedonia	6,635	7,991	7,100	6,000	6,000	6,000	6,000	6,000
Poland	67,584	63,547	59,484	59,557	58,000	60,000	65,000	65,000
Romania	33,737	39,979	26,043	32,781	30,000	31,000	35,000	35,000
Serbia and Montenegro	45,354	40,499	34,036	32,165	33,000	32,000	33,000	35,000
Slovakia	4,766	4,140	3,589	3,424	3,400	3,400	3,500	3,500
Slovenia	5,582	4,884	4,480	4,138	4,100	4,500	4,500	4,500
Total	311,000	266,000	228,000	231,000	220,000	230,000	240,000	240,000
Central Eurasia:								
Russia	138,000	86,000	84,000	100,000	85,000	90,000	95,000	100,000
Kazakhstan	1,000	3,300	4,900	2,500	2,500	2,500	2,500	2,500
Kyrgyzstan	1,700	200	225	277	300	300	300	300
Ukraine	1,000	800	1,000	900	1,400	1,500	1,500	1,500
Uzbekistan	3,000	2,900	2,300	2,800	3,000	3,000	4,000	6,000
Total	145,000	93,200	92,400	106,000	92,000	97,000	100,000	110,000
Western Europe:								
Austria	2,448	1,249	1,255	1,206	1,200	1,000	1,000	750
France	2,256	1,401	296	324	300	300	300	300
Gemany	356,600	207,096	167,691	175,364	180,000	180,000	150,000	150,000
Greece	49,909	56,553	65,000	60,000	65,000	65,000	65,000	65,000
Italy	15,493	352	19	14	10	10	10	10
Spain	20,970	10,776	12,153	12,193	12,000	11,000	10,000	10,000
Total	448,000	277,000	246,000	249,000	250,000	250,000	230,000	230,000
Grand total	904,000	637,000	567,000	587,000	570,000	580,000	570,000	580,000

e/ Estimated; estimated data are rounded to no more than two significant digits; may not add to totals shown.

1/ Totals are rounded to no more than three significant digits.

TABLE 9
EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED MINE PRODUCTION OF COPPER 1/

(Metric tons of Cu content)

	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Balkans and Central Europe:								
Albania	11,500	3,800	--	--	1,000	2,000	5,000	10,000
Bulgaria	26,000	76,000	92,000	88,000	85,000	85,000	90,000	90,000
Macedonia	7,300	6,000	6,000	9,000	10,000	10,000	10,000	15,000
Poland	329,000	384,200	465,000	545,000	500,000	500,000	550,000	550,000
Romania	32,000	24,500	16,100	19,000	20,000	20,000	20,000	25,000
Slovakia	3,100	--	--	--	--	--	--	--
Yugoslavia	110,000	74,600	41,000	22,000	30,000	50,000	60,000	75,000
Total	519,000	569,000	620,000	683,000	650,000	670,000	740,000	770,000
Central Eurasia:								
Armenia	15,000	8,080	7,231	7,000	7,500	8,000	9,000	9,000
Georgia	10,000	5,000	8,000	8,000	8,000	8,000	8,000	9,000
Kazakhstan	400,000	200,000	430,000	470,000	470,000	480,000	490,000	500,000
Russia	650,000	525,000	600,000	620,000	670,000	690,000	690,000	700,000
Uzbekistan	70,000	40,000	65,000	65,000	70,000	70,000	75,000	80,000
Total	1,150,000	778,000	1,110,000	1,170,000	1,200,000	1,300,000	1,300,000	1,300,000
Western Europe:								
Finland	12,600	9,790	14,354	12,000	13,000	13,000	14,000	14,000
France	483	--	--	--	--	--	--	--
Portugal	159,841	129,726	76,200	83,000	85,000	90,000	100,000	100,000
Spain	13,300	24,519	23,312	10,000	10,000	12,000	12,000	12,000
Sweden	74,300	83,603	77,765	74,000	69,000	70,000	72,000	74,000
United Kingdom	955	--	--	--	--	--	--	--
Total	261,000	248,000	192,000	179,000	180,000	190,000	200,000	200,000
Grand total	1,930,000	1,590,000	1,920,000	2,030,000	2,000,000	2,100,000	2,200,000	2,300,000

e/ Estimated; estimated data are rounded to no more than two significant digits; may not add to totals shown. -- Zero.

1/ Totals are rounded to no more than three significant digits.

TABLE 10
EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED PRODUCTION OF PRIMARY AND SECONDARY REFINED COPPER 1/

(Metric tons)

	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Balkans and Central Europe:								
Albania	11,000	3,000	--	--	--	--	--	--
Bulgaria	24,300	28,800	32,500	34,000	35,000	35,000	45,000	50,000
Czech Republic	20,800	20,000	20,000	18,000	20,000	20,000	20,000	20,000
Hungary	12,800	11,000	12,000	12,000	10,000	5,000	5,000	5,000
Poland	346,000	406,700	518,000	498,000	530,000	550,000	550,000	550,000
Romania	44,300	27,000	19,300	23,000	25,000	25,000	30,000	30,000
Slovakia	24,600	29,000	--	2,000	--	--	--	--
Yugoslavia	151,000	78,500	45,600	32,400	35,000	45,000	50,000	60,000
Total	635,000	604,000	647,000	619,000	660,000	680,000	700,000	720,000
Central Eurasia:								
Russia	900,000	560,000	800,000	895,000	860,000	900,000	950,000	1,000,000
Kazakhstan	365,000	255,500	394,700	422,000	420,000	430,000	430,000	440,000
Uzbekistan	110,000	95,000	80,000	80,000	80,000	85,000	90,000	95,000
Total	1,380,000	911,000	1,270,000	1,400,000	1,400,000	1,400,000	1,500,000	1,500,000
Western Europe:								
Austria	--	54,000	79,000	69,000	60,000	60,000	60,000	60,000
Belgium	331,857	376,000	423,100	425,000	420,000	400,000	400,000	380,000
Finland	65,100	73,700	114,035	116,000	110,000	110,000	110,000	120,000
France	44,034	42,500	1,500	2,000	1,500	1,200	1,000	1,000
Gemany	476,200	616,390	710,000	709,000	700,000	650,000	650,000	650,000
Italy	83,000	98,000	72,800	36,000	30,000	30,000	25,000	25,000
Norway								
Spain	170,567	164,213	316,000	291,000	300,000	300,000	280,000	280,000
Sweden	97,300	105,100	130,000	204,000	230,000	230,000	230,000	230,000
United Kingdom	121,634	54,799	3,000	45,000	--	--	--	--
Total	1,430,000	1,620,000	1,880,000	1,920,000	1,800,000	1,800,000	1,800,000	1,700,000
Grand total	3,440,000	3,130,000	3,800,000	3,940,000	3,900,000	3,900,000	3,900,000	4,000,000

e/ Estimated; estimated data are rounded to no more than two significant digits; may not add to totals shown. -- Zero.

1/ Totals are rounded to no more than three significant digits.

TABLE 11
EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED PRODUCTION OF NATURAL DIAMOND 1/

(Metric tons)

	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Central Eurasia, Russia:								
Gem grade	12,000	10,500	11,600	11,600	12,000	12,000	14,000	16,000
Industrial grade	12,000	10,500	11,600	11,600	12,000	12,000	14,000	16,000
Total	24,000	21,000	23,200	23,200	23,000	24,000	27,000	32,000

e/ Estimated; estimated data are rounded to no more than two significant digits; may not add to totals shown.

1/ Totals are rounded to no more than three significant digits.

TABLE 12
EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED MINE PRODUCTION OF GOLD 1/

(Kilograms)

	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Balkans and Central Europe:								
Bulgaria	2,400	3,100	2,347	2,540	2,500	3,000	3,500	3,500
Poland	300	510	367	349	450	450	450	450
Romania	3,000	4,000	3,500	3,500	3,500	3,500	3,500	4,000
Slovakia	500	518	306	157	200	200	200	200
Yugoslavia	8,170	3,040	1,121	800	1,500	2,000	3,000	4,000
Total	14,400	11,200	7,640	7,350	8,200	9,200	11,000	12,000
Central Eurasia:								
Armenia	1,000	514	400	400	1,800	4,000	4,200	4,400
Georgia	2,000	500	2,924	2,000	2,000	2,000	2,500	3,000
Kazakhstan	30,000	18,200	28,171	27,100	22,000	25,000	25,000	30,000
Kyrgyzstan	2,000	1,500	22,000	24,000	18,000	23,000	25,000	27,000
Russia	183,000	131,938	142,738	152,500	160,000	160,000	170,000	200,000
Tajikistan	2,500	500	2,700	2,700	3,000	3,000	3,500	4,000
Uzbekistan	65,000	65,000	80,000	87,000	80,000	80,000	80,000	80,000
Total	286,000	218,000	279,000	296,000	290,000	300,000	310,000	350,000
Western Europe:								
Finland	2,810	2,061	4,951	5,600	4,500	4,600	4,800	5,000
France	4,236	4,615	2,632	2,510	2,500	2,500	2,000	2,000
Italy	--	--	791	503	600	700	800	1,000
Portugal	276	--	--	--	--	--	--	--
Spain	6,814	4,131	4,310	3,720	3,700	3,600	3,500	3,500
Sweden	6,330	6,528	3,570	4,986	4,700	4,700	4,900	4,900
Total	20,500	17,300	16,300	17,300	16,000	16,000	16,000	16,000
Grand total	320,000	247,000	303,000	320,000	310,000	320,000	340,000	380,000

e/ Estimated; estimated data are rounded to no more than two significant digits; may not add to totals shown. -- Zero.

1/ Totals are rounded to no more than three significant digits.

TABLE 13
EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED PRODUCTION OF IRON ORE 1/

(Metric tons of Fe content)

	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Balkans and Central Europe:								
Albania	410,000	--	--	--	--	--	--	--
Bosnia and Herzegovina	1,580,000	52,000	36,000	36,000	40,000	40,000	50,000	50,000
Bulgaria	270,000	265,000	165,000	130,000	130,000	100,000	100,000	75,000
Macedonia	3,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Poland	130	--	--	--	--	--	--	--
Romania	275,000	147,000	55,000	63,000	60,000	60,000	50,000	50,000
Slovakia	480,000	225,000	260,000	260,000	250,000	250,000	250,000	250,000
Yugoslavia	650,000	61,000	--	--	--	--	--	--
Total	3,670,000	751,000	517,000	490,000	480,000	450,000	450,000	430,000
Central Eurasia:								
Azerbaijan	275,000	825	3,000	2,600	300	--	--	--
Kazakhstan	13,000,000	8,000,000	9,000,000	8,000,000	8,000,000	9,000,000	10,000,000	10,000,000
Russia	60,000,000	46,000,000	52,000,000	49,000,000	49,000,000	50,000,000	50,000,000	51,000,000
Ukraine	50,000,000	29,000,000	31,000,000	31,000,000	32,000,000	33,000,000	34,000,000	34,000,000
Total	123,000,000	83,000,000	92,000,000	88,000,000	89,000,000	92,000,000	94,000,000	95,000,000
Western Europe:								
Austria	653,000	709,000	590,000	575,000	500,000	500,000	300,000	100,000
France	2,793,000	430,000	--	--	--	--	--	--
Gemany	11,686	960	--	--	--	--	--	--
Norway	1,350,000	1,348,000	369,000	340,000	330,000	330,000	320,000	300,000
Spain	1,438,000	960,000	--	--	--	--	--	--
Sweden	12,900,000	13,880,000	13,556,000	12,811,000	13,000,000	13,000,000	13,000,000	14,000,000
United Kingdom	12,000	568	540	270	270	160	110	55
Total	19,200,000	17,300,000	14,500,000	13,700,000	14,000,000	14,000,000	14,000,000	14,000,000
Grand total	146,000,000	101,000,000	107,000,000	102,000,000	100,000,000	110,000,000	110,000,000	110,000,000

e/ Estimated; estimated data are rounded to no more than two significant digits; may not add to totals shown. -- Zero.

1/ Totals are rounded to no more than three significant digits.

TABLE 14
EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED MINE PRODUCTION OF LEAD 1/

(Metric tons of Pb content)

	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Balkans and Central Europe:								
Bosnia and Herzegovina	7,500							
Bulgaria	57,000	33,000	10,900	18,500	19,000	20,000	20,000	25,000
Macedonia	15,000	17,000	16,500	9,000	10,000	10,000	10,000	10,000
Poland	90,300	99,400	113,800	121,600	120,000	90,000	80,000	60,000
Romania	25,100	23,200	18,800	19,700	20,000	20,000	20,000	25,000
Yugoslavia	15,200	3,300	14,000	10,000	8,000	8,000	10,000	10,000
Total	210,000	176,000	174,000	179,000	180,000	150,000	140,000	130,000
Central Eurasia:								
Kazakhstan	200,000	70,000	40,000	37,700	38,000	40,000	45,000	45,000
Russia	30,000	23,000	13,300	12,300	14,000	15,000	15,000	15,000
Tajikistan	2,000	500	1,000	1,000	500	500	1,000	1,000
Total	232,000	93,500	54,300	51,000	53,000	55,000	61,000	61,000
Western Europe:								
France	1,141	--	--	--	--	--	--	--
Gemany	8,600	--	--	--	--	--	--	--
Greece	26,200	14,283	18,235	28,619	30,000	28,000	28,000	28,000
Ireland	35,300	46,100	57,825	44,500	55,000	60,000	65,000	65,000
Italy	15,600	15,400	2,000	1,000	1,000	500	--	--
Spain	61,472	30,346	40,300	49,500	50,000	50,000	40,000	35,000
Sweden	98,300	137,200	106,584	85,975	36,000	38,000	40,000	42,000
Total	247,000	243,000	225,000	210,000	170,000	180,000	170,000	170,000
Grand total	689,000	513,000	453,000	440,000	400,000	380,000	370,000	360,000

e/ Estimated; estimated data are rounded to no more than two significant digits; may not add to totals shown. -- Zero.

1/ Totals are rounded to no more than three significant digits.

TABLE 15
EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED PRODUCTION OF PRIMARY REFINED LEAD 1/

(Metric tons)

	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Balkans and Central Europe:								
Bosnia and Herzegovina	250	100	100	100	100	100	200	300
Bulgaria	66,600	71,200	84,100	89,000	90,000	90,000	90,000	95,000
Macedonia	22,000	22,500	22,900	7,000	7,000	10,000	15,000	15,000
Poland	64,800	66,421	59,900	66,000	66,000	65,000	60,000	55,000
Romania	15,700	22,000	22,900	24,000	30,000	30,000	30,000	35,000
Yugoslavia	48,000	23,600	1,242	--	170	500	1,000	2,000
Total	217,000	206,000	191,000	186,000	190,000	200,000	200,000	200,000
Central Eurasia:								
Kazakhstan	290,300	88,500	185,000	158,800	160,000	180,000	220,000	250,000
Russia	35,000	23,000	59,000	70,000	75,000	80,000	80,000	80,000
Total	325,000	112,000	244,000	229,000	240,000	260,000	300,000	330,000
Western Europe:								
Austria	8,391	--	--	--	--	--	--	--
Belgium	69,812	95,300	98,000	80,000	75,000	--	--	--
France	162,260	133,580	109,868	98,257	84,000	80,000	80,000	80,000
Gemany	207,600	146,750	210,515	153,743	150,000	150,000	130,000	130,000
Italy	64,600	84,900	75,000	82,000	80,000	80,000	75,000	75,000
Spain	60,000	--	--	--	--	--	--	--
Sweden	47,500	39,700	30,604	31,322	25,000	27,000	30,000	32,000
United Kingdom	156,000	150,000	166,411	203,000	210,000	210,000	210,000	210,000
Total	776,000	650,000	690,000	648,000	620,000	540,000	520,000	520,000
Grand total	1,320,000	968,000	1,130,000	1,060,000	1,000,000	1,000,000	1,000,000	1,100,000

e/ Estimated; estimated data are rounded to no more than two significant digits; may not add to totals shown. -- Zero.

1/ Totals are rounded to no more than three significant digits.

TABLE 16
EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED PRODUCTION OF SECONDARY REFINED LEAD 1/

(Metric tons)

	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Balkans and Central Eurasia, Romania	5,000	4,000	3,000	3,000	3,000	4,000	4,000	5,000
Central Eurasia, Ukraine	10,000	10,000	15,000	12,000	15,000	15,000	16,000	17,000
Western Europe:								
Austria	15,120	21,919	24,999	22,000	20,000	20,000	20,000	20,000
Belgium	37,000	26,400	20,000	16,000	91,000	100,000	100,000	100,000
France	108,210	156,470	158,226	143,338	110,000	130,000	130,000	130,000
Gemany	186,700	164,400	204,000	220,000	220,000	210,000	200,000	200,000
Greece	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
Ireland	15,000	11,000	9,000	13,000	12,000	9,000	9,000	8,000
Italy	102,000	95,500	160,000	121,000	150,000	150,000	150,000	150,000
Netherlands	44,000	20,000	22,000	24,000	25,000	25,000	20,000	20,000
Portugal	6,000	7,700	5,000	4,000	4,000	4,000	4,000	4,000
Spain	50,000	80,000	120,000	122,000	120,000	130,000	130,000	140,000
Sweden	22,100	51,500	47,255	44,056	40,000	43,000	45,000	45,000
Switzerland	6,000	6,000	10,100	9,800	9,800	8,000	8,000	8,000
United Kingdom	174,000	171,000	171,000	163,000	170,000	160,000	160,000	150,000
Total	771,000	817,000	957,000	907,000	980,000	990,000	980,000	980,000
Grand total	786,000	831,000	975,000	922,000	1,000,000	1,000,000	1,000,000	1,000,000

e/ Estimated; estimated data are rounded to no more than two significant digits; may not add to totals shown.

1/ Totals are rounded to no more than three significant digits.

TABLE 17
EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED PRODUCTION OF NATURAL GAS 1/

(Million cubic meters)

	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Balkans and Central Europe:								
Albania	243	28	11	11	10	9	10	10
Bulgaria	14	60	15	22	25	25	25	25
Croatia	1,989	1,966	1,768	2,009	2,100	2,200	2,200	2,500
Czech Republic	125	165	118	115	120	120	120	120
Hungary	4,932	5,451	3,010	2,947	2,800	2,800	2,800	2,800
Poland	3,866	4,803	4,956	5,175	5,300	5,300	5,300	5,300
Romania	28,336	19,016	14,607	14,090	13,000	14,000	14,000	14,000
Serbia and Montenegro	646	906	160	111	110	110	110	110
Slovakia	981	345	202	212	210	210	220	220
Slovenia	24	18	7	6	6	5	5	5
Total	41,200	32,800	24,900	24,700	24,000	24,000	24,000	25,000
Central Eurasia:								
Azerbaijan	9,900	6,600	5,600	5,500	5,100	5,000	5,000	7,000
Belarus	300	300	300	300	200	200	200	200
Georgia	40	3	100	40	20	200	200	200
Kazakhstan	7,100	5,900	11,500	11,600	13,000	16,000	32,000	40,000
Kyrgyzstan	100	40	30	30	30	30	30	30
Russia	641,000	595,000	584,000	581,000	600,000	610,000	620,000	640,000
Tajikistan	100	40	40	50	30	400	300	500
Turmenistan	84,000	32,300	47,000	46,300	54,000	68,000	75,000	85,000
Ukraine	24,000	18,200	17,800	18,300	18,000	19,000	19,000	19,000
Uzbekistan	42,000	48,600	55,600	56,400	58,000	58,000	60,000	62,000
Total	809,000	707,000	722,000	720,000	740,000	780,000	810,000	850,000
Western Europe:								
Austria	1,290	1,450	1,805	1,800	2,000	2,000	2,000	2,000
Denmark	--	6,320	9,700	9,700	8,100	9,800	9,900	10,000
France	3,031	2,830	1,873	1,810	1,800	1,800	1,800	1,800
Gemany	23,000	21,000	22,000	22,000	20,000	20,000	20,000	20,000
Ireland	57	2,800	2,500	2,500	2,500	2,500	2,500	2,500
Italy	17,296	20,400	18,500	18,000	16,000	15,000	15,000	15,000
Netherlands	74,100	78,350	69,200	74,000	75,000	72,000	70,000	68,000
Norway	27,900	27,800	42,000	41,000	40,000	39,000	37,000	35,000
Spain	1,553	422	179	180	180	180	180	180
United Kingdom	50,600	75,461	96,000	96,000	110,000	110,000	110,000	100,000
Total	199,000	237,000	264,000	267,000	280,000	270,000	270,000	250,000
Grand total	1,050,000	977,000	1,010,000	1,010,000	1,000,000	1,100,000	1,100,000	1,100,000

e/ Estimated; estimated data are rounded to no more than two significant digits; may not add to totals shown.

1/ Totals are rounded to no more than three significant digits.

TABLE 18
EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED MINE PRODUCTION OF NICKEL 1/

(Thousand metric tons of Ni content)

	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Balkans and Central Europe:								
Albania	8,800	--	--	--	--	--	--	--
Macedonia	--	3,500	--	--	2,000	3,000	5,500	5,500
Total	8,800	3,500	--	--	2,000	3,000	5,500	5,500
Central Eurasia:								
Kazakhstan	4,000	1,200	30	3,000	3,000	3,500	4,000	4,500
Russia	380,000	250,000	315,000	325,000	310,000	330,000	340,000	360,000
Ukraine	6,000	--	--	2,000	2,000	2,000	2,500	3,000
Total	390,000	251,000	315,000	330,000	320,000	340,000	350,000	370,000
Western Europe.								
Finland	11,500	3,439	2,600	2,000	2,500	2,400	2,200	2,000
Greece	18,500	19,974	20,000	20,000	21,000	20,000	20,000	19,000
Norway	3,100	3,386	2,538	3,000	1,700	1,600	1,400	1,200
Total	33,100	26,800	25,100	25,000	25,000	24,000	24,000	22,000
Grand total	432,000	281,000	340,000	355,000	340,000	360,000	380,000	400,000

e/ Estimated; estimated data are rounded to no more than two significant digits; may not add to totals shown. -- Zero.

1/ Totals are rounded to no more than three significant digits.

TABLE 19
EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED PRODUCTION OF PETROLEUM 1/

(Thousand 42-gallon barrels)

	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Balkans and Central Europe:								
Albania	7,049	3,435	2,110	2,172	2,300	2,300	2,300	2,300
Bulgaria	440	345	301	235	250	250	250	250
Croatia	15,422	11,127	13,115	8,308	8,200	8,200	8,000	8,000
Czech Republic	319	1,010	1,139	1,085	1,100	1,100	1,100	1,100
Hungary	13,206	11,166	7,500	7,000	7,000	7,000	7,000	7,000
Poland	1,209	2,166	4,844	5,704	5,500	6,000	6,000	6,000
Romania	61,685	52,925	47,815	47,450	46,000	46,000	45,000	45,000
Serbia and Montenegro	7,885	7,908	5,971	5,533	5,100	4,900	5,000	5,000
Slovakia	495	509	407	365	360	350	350	350
Total	108,000	90,600	83,200	77,900	76,000	76,000	75,000	75,000
Central Eurasia:								
Azerbaijan	91,875	67,620	102,900	109,515	110,000	110,000	150,000	220,000
Belarus	15,435	13,965	13,230	13,965	13,000	13,000	13,000	13,000
Georgia	1,470	294	735	735	520	740	1,500	2,200
Kazakhstan	189,630	150,675	259,455	294,735	350,000	380,000	440,000	550,000
Kyrgyzstan	700	700	700	700	700	700	700	700
Lithuania	--	700	2,300	3,500	3,200	3,300	3,500	3,600
Russia	3,793,000	2,256,000	2,381,000	2,558,000	2,800,000	3,000,000	3,100,000	3,200,000
Tajikistan	1,470	22	150	150	150	200	300	500
Turmenistan	41,895	33,075	54,390	58,065	62,000	68,000	81,000	96,000
Ukraine	39,690	30,135	27,195	27,195	27,000	27,000	27,000	27,000
Uzbekistan	19,845	55,860	55,125	55,125	51,000	48,000	44,000	44,000
Total	4,200,000	2,610,000	897,000	3,120,000	3,400,000	3,700,000	3,900,000	4,200,000
Western Europe:								
Austria	8,010	7,213	7,024	7,000	7,000	7,000	7,000	7,000
Denmark	45,400	67,858	87,860	88,130	89,000	89,000	90,000	91,000
France	22,036	18,284	11,591	10,082	10,000	10,000	10,000	10,000
Gemany	26,046	21,638	22,658	23,603	24,000	24,000	22,000	22,000
Italy	31,619	35,466	35,000	35,000	35,000	32,000	30,000	30,000
Netherlands	--	24,466	17,633	18,000	18,000	18,000	18,000	18,000
Norway	609,000	979,104	1,000,000	1,000,000	1,100,000	1,100,000	1,100,000	1,200,000
Spain	7,593	4,747	1,648	2,505	2,500	2,500	2,500	2,500
United Kingdom	687,015	914,250	884,115	820,845	820,000	820,000	820,000	800,000
Total	1,440,000	2,070,000	2,070,000	2,010,000	2,100,000	2,000,000	2,100,000	2,100,000
Grand total	5,750,000	4,770,000	5,050,000	5,200,000	5,500,000	5,800,000	6,000,000	6,400,000

e/ Estimated; estimated data are rounded to no more than two significant digits; may not add to totals shown. -- Zero.

1/ Totals are rounded to no more than three significant digits.

TABLE 20
EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED MINE PRODUCTION OF PHOSPHATE ROCK 1/

(Metric tons of P2O5 content)

	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Balkans and Central Europe	NA	NA	NA	NA	NA	NA	NA	NA
Central Eurasia:								
Russia	12,000,000	3,400,000	4,450,000	4,200,000	4,200,000	4,500,000	4,500,000	5,000,000
Kazakhstan	2,900,000	1,700	9,570	25,000	35,000	40,000	40,000	45,000
Uzbekistan	--	--	25,000	34,000	34,000	35,000	35,000	35,000
Total	14,900,000	3,400,000	4,480,000	4,260,000	4,300,000	4,600,000	4,600,000	5,100,000
Western Europe:								
Denmark	195	440	480	480	490	500	520	540
Finland	201,000	243,000	277,000	277,000	280,000	280,000	290,000	290,000
Total	201,000	243,000	277,000	277,000	280,000	280,000	290,000	290,000
Grand total	15,100,000	3,645,000	4,760,000	4,540,000	4,500,000	4,900,000	4,900,000	5,400,000

e/ Estimated; estimated data are rounded to no more than two significant digits; may not add to totals shown. NA Not available. -- Zero.

1/ Totals are rounded to no more than three significant digits.

TABLE 21
EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED PRODUCTION OF PLATINUM-GROUP METALS 1/

(Metric tons)

	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Central Eurasia, Russia:								
Platinum	44	31	34	35	34	36	37	37
Palladium	91	65	71	72	69	74	76	76

e/ Estimated.

TABLE 22
EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED MINE PRODUCTION OF SILVER 1/

(Kilograms)

	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Balkans and Central Europe:								
Bulgaria	54,000	30,000	54,534	56,806	60,000	70,000	70,000	70,000
Macedonia	15,500	16,000	20,000	15,000	20,000	20,000	20,000	20,000
Poland	832,000	1,001,000	1,144,000	1,190,000	1,200,000	1,200,000	1,200,000	1,200,000
Romania	80,000	60,000	18,000	18,000	20,000	20,000	30,000	50,000
Yugoslavia	85,900	31,100	9,070	5,800	10,000	15,000	20,000	20,000
Total	1,070,000	1,140,000	1,250,000	1,290,000	1,300,000	1,300,000	1,300,000	1,400,000
Central Eurasia:								
Armenia	1,000	184	1,300	1,300	5,500	4,000	4,000	4,000
Georgia	50,000	20,000	33,884	33,000	33,000	35,000	35,000	40,000
Kazakhstan	700,000	489,000	927,110	981,900	890,000	810,000	850,000	900,000
Russia	660,000	300,000	370,000	380,000	400,000	450,000	500,000	700,000
Tajikistan	5,000	5,000	5,000	5,000	5,000	6,000	8,000	10,000
Uzbekistan	70,000	70,000	89,900	80,000	80,000	85,000	90,000	95,000
Total	1,490,000	884,000	1,430,000	1,480,000	1,400,000	1,400,000	1,500,000	1,700,000
Western Europe:								
Finland	28,500	26,098	25,364	23,998	28,000	28,000	29,000	29,000
France	22,190	3,500	720	800	750	700	700	700
Gemany	8,000	--	--	--	--	--	--	--
Greece	62,600	33,000	37,145	61,500	75,000	75,000	75,000	75,000
Ireland	8,800	13,700	25,100	22,600	24,000	24,000	25,000	25,000
Italy	14,000	13,900	4,000	3,500	3,500	3,000	3,000	3,000
Portugal	722	38,600	20,430	23,100	24,000	24,000	22,000	20,000
Spain	270,000	123,615	83,000	60,000	60,000	50,000	50,000	50,000
Sweden	243,000	268,200	328,737	306,029	310,000	310,000	310,000	310,000
United Kingdom	2,695	--	--	--	--	--	--	--
Total	661,000	521,000	524,000	502,000	520,000	510,000	510,000	510,000
Grand total	3,210,000	2,540,000	3,200,000	3,270,000	3,200,000	3,200,000	3,300,000	3,600,000

e/ Estimated; estimated data are rounded to no more than two significant digits; may not add to totals shown. -- Zero.

1/ Totals are rounded to no more than three significant digits.

TABLE 23
EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED PRODUCTION OF CRUDE STEEL 1/

(Metric tons)

	1990	1995	2000	2001	2002 e/	2003 e/	2005 e/	2007 e/
Balkans and Central Europe:								
Albania	65,000	22,000	64,700	94,000	100,000	100,000	100,000	100,000
Bulgaria	2,185,000	2,724,000	2,020,000	1,942,000	2,000,000	2,000,000	2,000,000	2,000,000
Bosnia and Herzegovina	1,648,000	--	77,000	80,000	85,000	85,000	90,000	95,000
Croatia	423,533	45,373	71,021	58,000	65,000	65,000	65,000	65,000
Czech Republic	9,996,000	7,189,000	6,216,000	6,316,000	6,500,000	6,500,000	6,500,000	6,500,000
Hungary	2,963,000	1,865,000	1,871,000	2,056,000	2,000,000	2,000,000	2,000,000	2,000,000
Macedonia	247,000	33,000	50,000	--	50,000	50,000	70,000	80,000
Poland	13,625,000	11,890,000	10,498,000	8,809,000	8,500,000	8,500,000	8,500,000	8,500,000
Romania	9,761,000	6,557,000	4,770,000	4,930,000	5,000,000	5,300,000	5,300,000	5,300,000
Serbia and Montenegro	1,012,000	180,496	682,000	598,000	600,000	600,000	600,000	600,000
Slovakia	4,779,000	3,958,000	3,447,000	3,989,000	3,700,000	3,700,000	3,700,000	3,700,000
Slovenia	504,000	407,000	519,000	500,000	480,000	500,000	500,000	500,000
Total	47,200,000	34,900,000	30,300,000	29,400,000	29,000,000	29,000,000	29,000,000	29,000,000
Central Eurasia:								
Russia	89,600,000	51,600,000	59,098,000	59,000,000	60,000,000	62,000,000	64,000,000	65,000,000
Kazakhstan	6,754,000	3,027,000	4,770,000	4,694,000	4,900,000	5,000,000	5,200,000	5,400,000
Ukraine	55,000,000	23,309,000	31,780,000	33,110,000	34,000,000	36,000,000	38,000,000	39,000,000
Azerbaijan	NA	12,000	24,600	--	--	--	--	--
Belarus	NA	744,000	1,623,000	1,852,000	1,600,000	1,600,000	1,600,000	1,600,000
Georgia	1,200,000	84,000	49,500	50,000	50,000	50,000	50,000	50,000
Latvia	--	279,000	500,292	500,000	510,000	510,000	510,000	510,000
Moldova	NA	663,000	909,000	966,000	1,000,000	1,000,000	1,000,000	1,000,000
Uzbekistan	NA	352,000	420,000	460,000	500,000	500,000	500,000	500,000
Total	153,000,000	80,100,000	99,200,000	101,000,000	100,000,000	110,000,000	110,000,000	110,000,000
Western Europe:								
Austria	4,241,000	4,537,000	5,725,000	5,700,000	6,000,000	6,000,000	6,000,000	6,000,000
Belgium	11,419,000	11,606,000	11,637,000	12,000,000	11,000,000	11,000,000	11,000,000	11,000,000
Luxembourg	3,560,000	5,320,000	2,571,000	2,570,000	2,700,000	2,800,000	2,600,000	2,600,000
Denmark	610,000	654,000	750,000	760,000	770,000	780,000	790,000	800,000
Finland	2,861,000	3,176,000	4,096,000	4,100,000	4,200,000	4,200,000	4,300,000	4,400,000
France	19,015,000	18,096,000	21,002,000	19,431,000	21,000,000	20,000,000	20,000,000	18,000,000
Gemany	43,981,000	42,051,000	46,376,000	44,775,000	45,000,000	45,000,000	42,000,000	42,000,000
Greece	999,000	939,170	1,088,000	1,000,000	1,800,000	1,800,000	1,600,000	1,600,000
Italy	25,439,000	27,766,000	26,475,000	26,000,000	26,000,000	25,000,000	24,000,000	24,000,000
Netherlands	5,412,000	6,409,000	5,666,000	5,700,000	6,100,000	6,100,000	6,000,000	6,000,000
Norway	376,000	503,000	620,000	630,000	640,000	640,000	650,000	660,000
Portugal	744,000	829,000	1,088,000	900,000	800,000	800,000	700,000	600,000
Spain	12,718,000	13,975,000	15,844,000	15,834,000	16,000,000	17,000,000	16,000,000	16,000,000
Sweden	4,454,000	4,953,000	5,227,000	5,450,000	5,600,000	5,700,000	5,800,000	5,800,000
Switzerland	970,000	1,000,000	1,000,000	1,200,000	1,100,000	1,000,000	1,000,000	1,000,000
United Kingdom	17,908,000	17,604,000	15,306,000	15,000,000	12,000,000	12,000,000	11,000,000	10,000,000
Total	155,000,000	159,000,000	164,000,000	161,000,000	160,000,000	160,000,000	150,000,000	150,000,000
Grand total	354,000,000	274,000,000	294,000,000	291,000,000	290,000,000	300,000,000	290,000,000	290,000,000

e/ Estimated; estimated data are rounded to no more than two significant digits; may not add to totals shown. -- Zero.

1/ Totals are rounded to no more than three significant digits.

THE MINERAL INDUSTRIES OF

THE ADRIATIC BALKANS

ALBANIA, BOSNIA AND HERZEGOVINA, CROATIA, MACEDONIA, SERBIA AND MONTENEGRO, AND SLOVENIA

By Walter G. Steblez

Europe's Adriatic Balkan region is part of the southern portion of the Mediterranean Alpine folded zone, which extends through the Dinarides of former Yugoslavia (Bosnia and Herzegovina, Croatia, Macedonia, Serbia and Montenegro, and Slovenia), the Albanides of Albania, and the Hellenides of Greece. Mining for base and precious metals may be traced through historical records to at least the 5th century B.C. Copper mining at Serbia's Bor deposit may have had prehistoric beginnings.

By the early 1930s and until 2000, mineral deposits in the region were well-defined. Commercial resources of major base metals included those of aluminum, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, and zinc. Such precious metals as gold, silver, palladium, and platinum were found mainly in association with such base metals as copper, lead, and zinc. Industrial minerals were represented by a broad range of carbonate and silicate rocks, gravels, and sands as well as by clays and volcanic materials. Mineral fuels comprised coal (lignite), natural gas, and petroleum.

Until the early 1990s, the mining, processing, and downstream exploitation of base metals established the region as a major European source of copper, lead, and zinc and a major world producer of chromite. The transition of the region from central economic planning to market economy systems between 1991 and 2001 also began a swift deconstruction of existing political and social structures. The ensuing political, social, and ethnic tensions and conflict destroyed or degraded much of the region's mineral industries and industrial infrastructure. In 2001, social and political tensions in the region centered in the Province of Kosovo in Serbia and Montenegro and in Macedonia.

The future status of the minerals industries in the countries of the Adriatic Balkan region would be clarified following political settlement and normalization not only among the states in the region, but also within such countries as Bosnia and Herzegovina, Croatia, Macedonia, and Serbia and Montenegro.

ALBANIA

In 2001, Albania's economy in terms of the gross domestic product (GDP) grew by 6.5% compared with that of 2000; this growth, however, was fueled in large measure by transfers from abroad (more than 25% of GDP) in the form of donations, remittances, and some inflow of international capital. Although industrial production registered a growth of 5% and represented about 11.5% of the GDP, the country's minerals industry continued to undergo major production shortfalls (International Monetary Fund, 2002, p. 3; Treichel, 2002, p. 2-9). Mineral deposits traditionally associated with Albania include those of chromite, copper ore, and nickeliferous iron ore as well as those of natural gas and petroleum. In 2001, of the metal-bearing deposits, only those of chromite were under exploitation, although production of marketable chromite (concentrate and direct shipping ore) declined by about 30% compared with that of 2000, and the output of ferrochromium declined by about 4.8%. Such industrial minerals as dolomite, gypsum and marble, and phosphate rock have been worked only intermittently during the past several years. Albania's production of coal, natural gas, and petroleum also declined by about 20%, 4%, and 2%, respectively (table 1). The level of foreign investment in Albania's minerals sector had not changed appreciably since 2000. The ferrochromium plant at Elbasan was under the operational management of Italian ferrochomium producer Darfo S.p.A. The Turkish copper smelting concern Ber-Ober Madencilik San ve Tic As, which in 2000 was granted a 30-year concession to operate Albania's copper industry (mines and processing facilities in the Lezhe, Midrite, and Puke Districts), continued its work, although copper production during the year was not reported (European Bank for Reconstruction and Development, 2001a, p. 17; Kocibelli, 2002).

Albania's energy production was based on coal, hydropower, natural gas, and petroleum. The downturn in production of mineral fuels coupled with drought, which reduced electric power generation, placed the country's future developmental plans in doubt. Given Albania's recent history (1980s) as a net exporter of energy, the latest available data (2000) showed exports of mineral fuels as a percentage of total exports to have declined steadily to 1.9% from 3.4% in 1997. Imports of mineral fuels constituted about 9% of total imports, whereas they were 1.8% in 1997 (International Monetary Fund, 2001, p. 48-49). A proposed investment in Albania'a Patos Marinze oilfield by the International Finance Corporation (IFC) and other foreign investors aimed to modernize the country's petroleum extraction sector. The project, which was originally approved in 1998, was put on hold owing to a slump in oil prices in 1998 and 1999 but was reaffirmed in 2001. Successful implementation of this program would boost production to 23,000 barrels per day (bbl/d) from 7,000 bbl/d. The IFC would have a 15% interest in the project with a 26.1% contribution to the total cost ($197.5 million). The IFC projected that petroleum production at Patos Marinze would reach 10.8 million barrels (Mbbl) in 2003 from about 3.5 Mbbl (International Finance Corporation, 2001). The country reported that recoverable reserves of petroleum amounted to about 550 million metric tons (Mt).

BOSNIA AND HERZEGOVINA

The Federation of Bosnian Moslems and Croatians (FBC) and Republika Srpska (RS), which formed Bosnia and Herzegovina, continued to function as semiautonomous economic and political entities. The FBC administered about 51% of Bosnia and Herzegovina's territory; the balance of the territory was administered by RS. In 2001, major progress to integrate the FBC and RS entities was not evident. This lack of progress continued to be reflected by a less-than-clear economic picture that resulted from disparate reporting by each side to the Agency for Statistics in Sarajevo (U.S. Central Intelligence Agency, 2002a).

Foreign financial assistance and transfers from abroad continued to be among the mainstays of economic growth. The growth rate of the GDP in 2000 was about 5.8% compared with that of 1999; a growth rate of about 5.6% was anticipated for 2001. Industrial output constituted about 26% of Bosnia and Herzegovina's GDP. The contribution to the GDP by the mining and quarrying and processing sectors of the FBC and RS amounted to about 2.8% and 1.3%, respectively (World Bank Group, 2002b, p. 1, 22, 40). The overall contribution of the private sector to Bosnia and Herzegovina's GDP was low (about 35%). Private ownership in the mining and quarrying and mineral-processing spheres in the FBC and RS was less than 1% of total privatized enterprises in the country. To correct this imbalance, the Governments of the FBC and RS agreed to accelerate the denationalization process of large-scale industrial enterprises and utilities with financial assistance from such international institutions as the European Union (EU), the World Bank, and the U.S. Agency for International Development (World Bank Group, 2001). These and other organizations formed the International Advisory Group on Privatization, which supported a plan to privatize 86 enterprises in the FBC and 52 in RS. Enterprises for metal processing, machine building, and construction materials manufacturing were among the proposed groups. The FBC's major steel producer BH Steel-Zeljezara in Zenica also was included in this plan.

In 2001, the major developments in Bosnia and Herzegovina's minerals industry took place mainly in the FBC. Aluminum (Mostar) bauxite and alumina (in the southern and western FBC), and coal (Tuzla and Zenica regions) were the leading minerals produced in the FBC. Lead and zinc ore had been produced at Olovo and Vares, but the mining status at these operations in 2001 remained uncertain. Iron ore production was centered at Jablanica and Vares, and manganese ore, at Bosanska Krupa. The FBC also has exploitable resources of barite, gypsum, magnesite, and rock salt. In 2001, the levels of output of these and other minerals commodities, however, were not adequately reported.

BH Steel announced plans for facility expansion in 2001. A contract was awarded to Danieli SpA of Italy to supply the steel mill with a new 100-metric-ton (t) electric arc furnace (EAF), a ladle furnace, and a five-strand high-speed billet caster [940,000 metric tons per year (t/yr)]. The new facility would produce basic and high-quality steels in the range of 130 to 180 millimeters. BH Steel became a major recipient of foreign investment in 1999 when the Government of Kuwait purchased 50% of the enterprise's shares of stock (Kohl 2001; Metal Bulletin, 2001b).

A major development in the country's nonferrous metals sector involved the modernization of FBC's aluminum producer Aluminij d.d. Mostar. The modernization program, which was valued at about $63 million and whose completion reportedly was scheduled for the third quarter of 2002, was to be carried out under the auspices of such EU companies as VAW Aluminium Technologie GmbH, Daimler-Chrysler, and Procedair Pollution Control. The modernization program was to include conversion of the 256-pot smelter to a center-worked pot system from side-worked Pechiney units, which had been installed in the early 1980s (Metal Bulletin, 2001a). The modernization program reportedly would protect the existing workforce and add additional jobs at the Mostar aluminum plant.

Another important development involved the continuing privatization of the FBC's cement industry. In 2001, D.D. Fabrika Cementa Lukavac became fully privatized through the sale of Government assets worth about 77% of total stock value. The Government's offer included the sale of about 67% of its shares through international tender; the balance, through the public sale of stock. In October, Alas International Baustoffproduktion AG of Austria obtained 51% of Lukavac's stock for $15.7 million. Lukavac, which had a production capacity (dry process) of 340,000 t/yr of cement, would continue to obtain all its limestone feedstock (up to 250,000 t/yr) from a nearby Government-owned limestone quarry. As part of the agreement, Alas International planned to invest about $52 million in the course of a 3-year period and would maintain the existing level of employment. Other bidders included Heidelberger Zement of Germany, which had acquired the country's other cement producer Tvornica cementa Kakanj in 2000 (Dani, 2001; Novac, 2001).

RS was known to mine coal and lignite and metal ores that included bauxite (aluminum), iron, and lead and zinc. Industrial mineral production included asbestos, ceramic and refractory clays, gypsum, limestone, magnesite, marble, and silica.

CROATIA

Croatia continued to produce minor quantities of metals and industrial minerals, mainly for domestic consumption. Petroleum extraction and refining were the major sectors of Croatia's minerals industry.

In 2001, the value of Croatia's total industrial production rose by 6% compared with that of 2000. The value of output of the mining and quarrying sector, as a whole, rose by about 2%. The petroleum and natural gas sector (less surveying), however, fell short of the 2000 level of output by about 3%. The gross value of output of coke and petroleum refinery products also declined (5%) compared with that of 2000 (CROSTAT, 2002). Actual production in this sector showed mixed results as natural gas output increased by 14% and that of petroleum declined by about 8%.

The gross value of output of the country's mining and quarrying operations, other than those associated with hydrocarbons, increased by about 11.3%, and that of processed industrial minerals, by 6.5% compared with that of 2000. The production, by weight, of such building materials as lime and cement increased by about 15% and 14%, respectively (CROSTAT, 2002).

The value of base-metals production increased by about 4.2%. In terms of units of physical output, the production levels of aluminum semimanufactures and ingot (primary and secondary) rose by 13% and 6%, respectively, compared with those of 2000. The production of crude steel (about 58,000 t) declined considerably (18%). In 2001, efforts to privatize the steel industry focused on Zeljezara Sisak d.d., which was located southwest of Zagreb. Prospective buyers included Russian, Slovak, and Swiss steel pipe producers and traders. The pace of privatization, however, was uncertain owing to Sisak's financial problems that arose during the period of civil strife in former Yugoslavia. Following bankruptcy, Sisak (mainly a producer of welded and seamless pipe) went into receivership and required court approval to privatize. Most of Sisak's shares were held by the power utility and several other Government agencies. In 2001, Sisak's production reportedly ranged from 5,000 to 7,000 metric tons per month, or about one-third of capacity (Metal Bulletin, 2001b).

Croatia's other principal steel producer Jadranska Zeljezara Split was located in Split on the coast of the Adriatic Sea. In 2001, Jadranska reported nearing the completion of a $9.7 million investment program, which required the closure of the operations in August. Operations were scheduled to restart in early 2002 and were to include a new EAF (about 82,000 t/yr), a modernized billet casting unit (80,000 t/yr), and a bar mill (76,000 t/yr). A program of facility expansion and full modernization of steel capacity at Jadranka was undertaken by Voest-Alpine Industrieanlagenbau of Austria (Metal Bulletin, 2001c).

Almost all categories of industrial minerals showed growth in 2001 compared with output levels of 2000. The primary activity in this sector involved conversion from fuel oil to coal as a fuel source at the Dalmacijaicement and Nasicecement D.D. cement plants (World Cement, 2001).

Croatia's state-owned oil company Industrija Nafte d.d. Zagreb (INA) continued to operate domestic gasfields and oilfields southeast of Zagreb near the Hungarian border and along the Adriatic coast. Imports, however, which were conveyed via the Adria pipeline, remained Croatia's chief source of petroleum. In early 2001, offshore oil and gas exploration yielded results in the northern Adriatic Sea with the discovery of a natural gas deposit at the Marcia 1 well. A total of four wells were drilled in that area (Oil & Gas Journal, 2001). The privatization of the oil and gas industry was a subject of study and recommendations by several international banking and consulting organizations; these recommendations included initial public stock offerings and strategic partnerships. The Government initially planned to restructure this sector into separate petroleum and natural gas commercial entities (Oil & Gas Journal, 2000; Seperic and Zivkovic, 2000).

In late 2001, a final protocol was signed by the Croatian and Russian Governments to initiate exports of Russia's Siberian petroleum through the Druzhba-Adria pipeline. The delivery of petroleum by the Druzhba-Adria route would allow Russian oil deliveries to bypass the Bosporus and Dardanelles Straits by transiting from Russia through Belarus, Ukraine, Slovakia, and Hungary; the pipeline's final outlet will be the Croatian port of Omisalj. Reportedly, severe restrictions on oil tanker tonnage that passes through the Bosporus and the Dardanelles were imposed by Turkey (Alexander's Gas & Oil Connections, 2002).

MACEDONIA

The Former Yugoslav Republic of Macedonia is well-endowed with mineral deposits necessary for the production of copper, iron, lead, precious metals, and zinc. A processing and fabricating infrastructure also was established that allowed the production of not only these metals and their alloys, but also such ferroalloys as ferrochromium, ferromanganese, and ferronickel. Also, such industrial minerals as bentonite, feldspar, gypsum, sand and gravel, and stone (carbonate and silicate) as well as cement and other construction materials that are based on quarried products were produced mainly for export. The strong economic recovery of Macedonia that began in 2000 ended in 2001 as the country experienced increased ethnic tensions and conflicts, which partly were the outcome of the conflict in recent years in neighboring Serbia's Kosovo Province.

In 2001, the country's GDP contracted by about 4% compared with that of 2000; industrial production fell by 8% (U.S. Central Intelligence Agency, 2002b). The available volume output indices for 2002, which were published by the State Statistical Office of Macedonia, showed that the total output of mining and quarrying had declined by about 1.8% compared with the 2000 output level (Drzhaven Zavod za Statistika, 2002). Individual subcategories of mining and quarrying, however, showed that mine output of lignite and metal ores remained at the same levels as those achieved in 2000, although mine production of industrial minerals showed a decline of about 5.5%. With respect to minerals processing, base metals, the production of coke and refined petroleum, and manufactured industrial minerals showed shortfalls of about 5.6%, 5.2%, and 1.0%, respectively.

Although mineral industry issues and events in 2001 were limited in scope, they included continuing interest in the Bucim cooper-gold open pit mine in the southern part of the country, which was privatized in 2000. Having conducted an audit of the mine in early 2001, CSMA Consultants Ltd. was hired to provide technical assistance to make the operation profitable (CSMA Consultants Ltd., 2002). In the steel sector, AD Makstil (a subsidiary of Duferco International Investment Holding Ltd.) reported that modernization of the steel shop and caster and the plate mill were nearing completion in 2001. Also, because of a favorable European plate market, Makstil reported overall good financial results at yearend (Duferco S.A., 2002).

The plan to build the Thessaloniki-Skopje crude petroleum pipeline, which won the approval of the European Bank for Reconstruction and Development to obtain a $50 million finance loan in December 2000, was finally adopted in January 2001. When completed, the pipeline would carry about 2.5 million metric tons per year of petroleum from the Greek port of Thessaloniki to the pipeline's terminus at the OKTA refinery in Skopje (European Bank for Reconstruction and Development, 2001b, p. 2).

SERBIA AND MONTENEGRO

In 2001, Serbia and Montenegro's postwar economy continued to recover, and the GDP was officially reported to have increased by 6.2% compared with that of the preceding year. Despite overall economic improvement, however, the total volume of industrial production remained at about the level of output of 2000, and the output of the mining and quarrying component contracted by 13%. The mine output of oil and gas and coal declined by 18% and 8%, respectively; the production of metals and industrial minerals declined by 29% and 7%, respectively (Federal Statistical Office of Yugoslavia, 2002a, b). Owing to unresolved political and social issues in the Province of Kosovo, Serbia and Montenegro excluded official data about Kosovo's economy and minerals industry from official reports since 1999. Although the future of Kosovo's political status remains uncertain, its mineral wealth is not. Kosovo encompasses substantial portions of Serbia and Montenegro's kaolin, lignite, lead and zinc, nickel, and magnesium deposits. Other deposits with prospective commercial value include bauxite, chromite, limestone, marble, and quartz (Vukovic and Weinstein, 2002). With respect to RMHK Trepca, which was the lead and zinc mining and smelting complex in Kosovo, The United Nations Interim Administration Mission in Kosovo continued to work on environmental cleanup at the site and preparation for Trepca's eventual operation (Cundy, 2002). Trepca ceased operations during the Kososvo crisis in 1999 owing to war damage and ownership disputes.

In contrast to the output of most metals during the year, aluminum and alumina production registered gains of 14% and 9%, respectively, compared with 2000 production levels. Exports of primary aluminum and aluminum alloys amounted to 95,794 t, which was an increase of about 6%. In 2000, Kombinat Aluminijuma Podgorica (KAP) in Montenegro, which was the country's sole producer of primary aluminum, undertook a rationalization program that was instrumental in increasing output at the facility in 2001. KAP management and the Government of Montenegro reported plans to modernize the plant further in preparation for privatization (World Bank Group, 2002a).

In 2001, mine production of copper declined by about 45%, and the output of primary refined copper, by about 29% compared with 2000 production levels. Exports of copper, however, appear to have risen in 2001 by about 13% to 73,881 t (all forms). The year was marked by continuing financial difficulties at Bor that stemmed, in part, from damage sustained at several facilities during the Kosovo crisis of 1999 as well as by mineworker strikes over late wages. Apart from copper production from domestic sources, Bor also has been toll smelting copper concentrates for foreign producers in Greece and several other Balkan countries. General imports of copper concentrates in 2001 declined to 50,000 t from 68,000 t in 2000. Mytilineos SA of Greece was one of Bor's toll smelting contractors that expressed an interest in acquiring Bor's smelting and refining capacities in the course of the company's privatization (Metal Bulletin, 2001d; Federal Statistical Office of Yugoslavia, 2002a).

Lead and zinc ore production declined by 29%. Smelter and refinery production of lead appeared to be virtually moribund because no output was reported for either category in 2001. Refined zinc, however, was one of the few instances of an increase in metal production; it rose to 13,467 t from 8,291 t in 2000 and appeared to be nearing the most recent high output level in 1998. Other production shortfalls among metals were noted for silver (37%), magnesium (34%), and such ferrous metals as pig iron (18%), crude steel (12%), and steel semimanufactures (9%) (table 1).

A similar situation prevailed with respect to the output of industrial minerals and mineral fuels. Cement, however, was a major exception with output having risen by about 14% compared with that of 2000. A salient event in the industrial minerals sector was an announcement in late 2001 by Erin Ventures Inc. of British Columbia, Canada, that it would proceed with the development of the Piskanja borate deposit and study the entire Jadranol Basin (host to the Podrdjski borate deposit) pending final approval by Serbian Government authorities and finalization of discussions with an international chemical company to form a joint-venture partnership. The Government's studies undertaken in the late 1980s revealed that the Piskanja deposit had borate resources that amounted to at least 7 Mt, at a grade of 39.39% boron oxide (Erin Ventures Inc., 2001, 2002).

The production of all fossil fuels declined—coal by 5%, natural gas by 31%, and petroleum by 7%—compared with 2000 production levels. To overcome these shortfalls, official trade data for 2001 registered significant increases in the import of natural gas and petroleum. Petroleum imports rose to more than 1.8 Mt from 158,000 t in 2000; natural gas output increased to 847,000 t from 485,000 t. A significant development during the year involved the planned drilling for oil by Ramco Energy in a region of Macedonia believed to have commercially significant deposits of petroleum and natural gas (Alexander's Gas & Oil Connections, 2001).

SLOVENIA

Slovenia's GDP grew by about 3% in 2001compared with that of 2000, and total output of industry, by about 2.9% (Statistichi Urad Republike Slovenije [Statistical Directorate of the Republic of Slovenia], 2002, p. 60). The country's positive economic performance over several years to a large extent mirrored a political and social environment that was more stable than that of the rest of the republics that formed former Yugoslavia. Slovenia's industries and infrastructure also compared more favorably with those of the EU member countries than with those of its former Yugoslav partners.

Within the context of global and regional mineral production levels, Slovenia's modest minerals output included coal, natural gas, petroleum, and a variety of industrial minerals. Mineral raw materials required by the country's industries were met mainly through imports. Preliminary trade returns for 2001 show Slovenia's net import reliance (in value) on crude and refined petroleum (almost 100%), iron and steel (65%), and nonferrous metals (6.5%) (Statistichi Urad Republike Slovenije [Statistical Directorate of the Republic of Slovenia], 2002, p. 60).

In 2001, mining and quarrying as a percentage of GDP was reported to be 0.9%, which was a decline of more than 7% compared with that of 2000. The total volume of mine production showed a decline of about 8%. The output of basic metals and semimanufactures, however, showed a gain of about 6.7%. The year's mining results in the mineral fuels branch registered declines in natural gas, lignite, and brown coal production of about 10%, 8%, and 7%, respectively. Although a rise in production was indicated for crude petroleum, the actual output of this commodity was negligible (Statistichi Urad Republike Slovenije [Statistical Directorate of the Republic of

Slovenia], 2002, p. 60, 61). The contraction of mining and quarrying output correlated with the decline of 8.3%, 15.5%, 5.3%, and 2.6% in 2001, 2000, 1999, and 1998, respectively, in the sector's labor force. Employment increases, however, were recorded mainly in the service sectors of Slovenia's economy (Bednas, 2000, p. 142-143).

Slovenia's metallurgical sector largely consisted of primary aluminum production at Kidriçevo (Talum d.o.o.) and three steel mills. The state-owned holding company Slovenske Železarne (SŽ) maintained ownership of SŽAcroni Jesenice d.o.o. (Acroni) and SŽ Metal Ravne d.o.o. (Metal Ravne). In 2001, SŽ reported seeking foreign investors, preferably joint-venture arrangements, in its Acroni and Metal Ravne operations (Barrett, 2001, p. 19).

Acroni's total steelmaking capacity amounted to about 490,000 t/yr of which less than one-half had been utilized in recent years. An investment program to modernize Acroni from 2000 through 2004 ($52 million) was set to raise the plant's stainless production to 100,000 t/yr from 50,000 t/yr. The modernization of plant's process control system and the reheat furnace also was scheduled. Another major component of Acroni's investment program addressed the improvement of environmental aspects of steelmaking, which included dust abatement at EAF operations, upgrading the water treatment system, and dust removal and slag handling and processing (Barrett, 2001, p. 18). In addition to stainless steel, Acroni also produced alloy and carbon steels. Most of the planned investment at Metal Ravne for 2001 (about $4.5 million) was to go for the modernization of the plant's medium section mill. Metal Ravne produced about 150,000 t/y of carbon alloy and stainless steels.

Investment plans for 2001 (about $2.7 million) at Inexa Štore (formerly Jekla Štore; a subsidiary of the Inexa Group of Sweden since 1999) called for the modernization of the EAF and continuous caster; also, the construction of the smelter's dust-abatement technology was to begin in 2001 and be fully installed by 2003. Inexa Štore had a 145,000-t/y capacity to produce engineering, forging, and spring steels (Barrett, 2001).

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TABLE 1
ALBANIA: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/	1997	1998	1999	2000	2001
METALS					
Bauxite	4,454	4,128	4,624	5,000	5,000
Chromium:					
Chromite, gross weight e/	157,203	150,285	79,445	57,000 r/	55,000
Marketable ore, 41.6% Cr_2O_3	84,423	81,994	64,597	117,000 r/	86,000 3/
Concentrate	21,881	20,195	6,837	3,400 r/	-- 3/
Total marketable ore and concentrate	106,304	102,189	71,434	120,400 r/	86,000 3/
Ferrochromium	31,144	30,252	28,120	12,500 r/	11,900 3/
Copper:					
Ore:					
Gross weight	24,895	53,477	33,945	-- r/	--
Concentrate	869	2,294	8,691	-- r/	--
Cu content e/	220	3,200	900	-- r/	--
Metal, primary:					
Smelter, blister	--	1,632	1,281	-- r/	--
Refined, electrolytically	--	1,150	342	-- r/	--
Iron and steel:					
Pig iron e/	10,000	10,000	10,000	-- r/	--
Crude steel e/	20,533 r/	19,527 r/	15,600 r/	64,700 r/	94,100 3/
Rolled steel	43,000	42,000	8,700	-- r/	--
INDUSTRIAL MINERALS					
Cement, hydraulic thousand tons	100 r/	84 r/	106 r/	180 r/	--
Clay, kaolin e/	500	500	422 r/	420 r/	385 3/
Dolomite e/	50,000	50,000	50,000	50,000	50,000
Fertilizer, manufactured:					
Phosphatic	26,604	12,284	8,600	-- r/	--
Urea e/	3,000	3,000	3,000	--	--
Nitrogen, N content of ammonia e/	10,000	10,000	10,000	-- r/	--
Olivinite e/	300	300	300	200	200
Phosphate rock, 12%-15% P_2O_5 e/	1,000	1,000	1,000	-- r/	--
Pyrite, unroasted	--	--	--	--	
Salt e/	10,000	10,000	10,000	--	--
Sodium compounds n.e.s., soda ash, calcined e/	100	--	--	--	
Sulfuric acid e/	500	500	500	500	500
MINERAL FUELS AND RELATED MATERIALS					
Asphalt and bitumen, natural 4/ thousand tons	16,900	15,782	16,625	16,000 r/	15,000
Coal, lignite do.	38,900	49,000 r/	28,000 r/	20,600 r/	16,400 3/
Gas, natural, gross production 5/ thousand cubic meters	18,271	16,551	14,167	11,490 r/	10,980 3/
Petroleum:					
Coke	33,678	57,842	47,543	46,000 r/	45,000
Crude:					
Gross weight thousand tons	359,666	364,627	323,009	314,000 r/	308,000 3/
Converted e/ thousand 42-gallon barrels	2,400	2,000	2,400	2,100 r/	2,000
Refinery products	315,072	379,131	328,875	324,000	310,000

e/ Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. r/ Revised.

1/ Table includes data available through August 2002.

2/ In addition to the commodities listed, a variety of industrial minerals and construction materials (common clay, quartz, titanomagnetite, stone, and sand and gravel) are produced, but output is not reported quantitatively, and available information is inadequate to make reliable estimates of output levels.

3/ Reported figure.

4/ Includes asphalt and bitumen produced at petroleum refineries.

5/ Separate data on marketable production are not available, but gross and marketed output are regarded as being nearly equal.

TABLE 2
ALBANIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2001 1/

(Thousand metric tons unless otherwise specified)

Commodity	Location of main facilities (all state-owned)	Annual capacity
Cement	Elbasan, 32 kilometers southeast of Tirana; Kruje, 20 kilometers northwest of Tirana; Shkoder, 85 kilometers northwest of Tirana; and Vlore, southwest of Tirana	1,200
Chromite	Bater (including Bater I and II and Martanesh), 40 kilometers northwest of Tirana	450
Do.	Bulquize (including Bulquize south, Fush, Termove, and Todo Maco), 35 kilometers northwest of Tirana	450
Do.	Kalimash, 60 kilometers north of Tirana	250
Do.	Kam, 70 kilometers north of Tirana	100
Do.	Klos, 20 kilometers northeast of Tirana	50
Do.	Pogradec (including Katjiel, Memelisht, Pishkash and Pojske Prrenjas), 50 kilometers east of Tirana	100
Ferrochromium	Burrel, 35 kilometers northeast of Tirana	40
Do.	Elbasan, 32 kilometers southeast of Tirana	36
Copper:		
Ore	Fushe-Arrez, 80 kilometers north of Tirana	350
Do.	Gjejan, 100 kilometers northeast of Tirana	150
Do.	Golaj (including Nikoliq and Pus), 120 kilometers northeast of Tirana	150
Do.	Kurbnesh-Perlat, 55 kilometers northeast of Tirana	100
Do.	Rehove, 110 kilometers southeast of Tirana	100
Do.	Reps (including Gurch, Lajo, Spac, and Thurr), 55 kilometers north of Tirana	350
Do.	Rreshen, 50 kilometers north of Tirana	50
Do.	Shkoder (including Palaj, Karma I and II), 85 kilometers northwest of Tirana	100
Smelter	Kukes, 110 kilometers northeast of Tirana	6
Do.	Lac, 35 kilometers northwest of Tirana	7
Do.	Rubik, 50 kilometers north of Tirana	4
Iron ore	Prrenjas (Bushtrica, Prrenjas, Skorska I and II), 70 kilometers southeast of Tirana	650
Do.	Guri i Kuq (including Cervenake, Grasishta, Guri i Kuq, Hudenisht and Guri Pergjrgjur), 25 kilometers east of Tirana	500
Steel	"Steel of the Party" Metallurgical Combine at Elbasan	150
Nickel, smelter	Elbasan	6
Coal, lignite	Maneze, Mezes, and Valias Mines in Tirana Durres area; Krabe Mine, 20 kilometers southeast of Tirana; Alarup and Cervnake Mines, in Pogradec area, 80 kilometers southeast of Tirana; Mborje-Drenove Mine in Korce area, 85 kilometers southwest of Tirana; and Memaliaj Mine in Tepelene area, 110 kilometers south of Tirana	2,500
Natural gas million cubic feet	Gasfields on southwest Albania between Ballsh and Fier	16,000
Petroleum:		
Crude 42-gallon barrels per day	Oilfields at Marineze, Ballsh, Shqisht, Patos, Kucova, Gorrisht, and others	35,000
Refined do.	Ballsh, Cerrik, Fier, and Stalin Refineries	33,000

1/ A substantial portion of these enterprises have been operating significantly below capacity during the transition to a market economy; the capacities provided in this table only represent the latest available information and may not show the true status of these enterprises.

TABLE 3
BOSNIA AND HERZEGOVINA: ESTIMATED PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/		1997	1998	1999	2000	2001
METALS						
Aluminum:						
Bauxite		75,000	75,000	75,000	75,000	75,000
Metal, ingot; primary and secondary		40,000	38,000	70,000	94,500	100,000
Iron and steel:						
Ore and concentrate:						
Ore, gross weight		100,000	100,000	100,000	100,000	100,000
Ore, Fe content		35,000	35,000	35,000	36,000	36,000
Metal:						
Ferroalloys:						
Ferrosilicon		1,000	10,000 r/	15,000 r/	20,000	20,000
Pig iron		60,000 r/	58,000 r/	45,000 r/	57,000 r/	60,000
Crude steel:		72,000 r/	75,000 r/	60,000 r/	77,000 r/	80,000
Electric arc furnace		14,000	19,000	20,000	24,000	25,000
Opern hearth furnace		58,000	56,000	40,000	53,000	55,000
Semimanufactures		57,000 r/	67,000 r	75,000 r/	16,000 r/	60,000
Lead:						
Mineral concentrator output:						
Ore, gross weight (Pb-Zn ore)		10,000	10,000	10,000	10,000	10,000
Pb content of ores		200	200	200	200	200
Pb concentrate		400	400	400	400	400
Metal, smelter, primary and secondary		100	100	100	100	100
Manganese ore:						
Gross weight		2,000	2,000	2,000	2,000	2,000
Mn content		500	500	500	500	500
Zinc:						
Zinc content of Pb-Zn ore		300	300	300	300	300
Concentrate output, gross weight		600	600	600	600	600
INDUSTRIAL MINERALS						
Asbestos, all kinds		500	500	500	500	500
Barite concentrate		2,000	2,000	2,000	2,000	2,000
Cement	thousand tons	200	300	300	300	300
Clays:						
Bentonite		800	800	800	800	800
Ceramic clay, crude		20,000	20,000	20,000	20,000	20,000
Kaolin:						
Crude		3,000	3,000	3,000	3,000	3,000
Calcined		1,500	1,500	1,500	1,500	1,500
Gypsum:						
Crude		30,000	30,000	30,000	30,000	30,000
Calcined		3,000	3,000	3,000	3,000	3,000
Lime	thousand tons	50	50	50	50	50
Magnesite, crude		2,000	2,000	2,000	2,000	2,000
Nitrogen, N content of ammonia		500	500	500	500	500
Quartz, quartzite, glass sand: Glass sand		50,000	50,000	50,000	50,000	50,000
Salt, all sources		50,000	50,000	50,000	50,000	50,000
Sand and gravel, excluding glass sand	thousand cubic meters	500	500	500	500	500
Sodium compounds:						
Soda ash		5,000	5,000	5,000	5,000	5,000
Caustic soda		5,000	5,000	5,000	5,000	5,000
Sodium bicarbonate		500	500	500	500	500
Stone, excluding quartz and quartzite, Dimension, crude:						
Ornamental	square meters	20,000	20,000	20,000	20,000	20,000
Other	cubic meters	2,000	2,000	2,000	2,000	2,000
Crushed and brown, n.e.s.	thousand cubic meters	500	500	500	500	500
Sulfur, byproduct of metallurgy		1	1	1	1	1
MINERAL FUELS AND RELATED MATERIALS						
Brown coal and lignite	thousand tons	1,810 r/ 3/	1,764 r/ 3/	1,800	1,900 r/	1,900
Coke		--	--	--	--	
Petroleum refinery products	thousand 42-gallon barrels	500	500	500	500	500

r/ Revised.

1/ Table includes data available through March 2002. Estimated data are rounded to no more than three significant digits.

2/ In addition to commodities listed, common clay was also produced, but available information was inadequate to make reliable estimates of output.

3/ Reported figure.

TABLE 4
BOSNIA AND HERZEGOVINA: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies	Location of main facilities	Annual capacity
Alumina		Aluminij d.d. Mostar	Plants at Birac-Zvornik	600
Do.		do.	Plant at Mostar	280
Aluminum		do.	Smelter at Mostar	92
Bauxite		do.	Mines at Vlasenica, Jajce, Bosanska Krupa, Posusje, Listica, Citluk, and other locations	2,000
Cement		Gik Hidrogradnja, Tvornica Cementa	Plant at Kakanj	650
Coal:				
Brown		SOUR Titovi Rudnici Uglja, Tuzla	Mines in BiH	12,000
Lignite		do.	do.	7,000
Ferroalloys		Elktrobosna, Elektrohemijska i Eletrotermijska Industrija	Plant at Jajce	80
Iron ore		Rudarsko Metalurski Kombinat Zenica (RMK Zenica)	Mines at Vares, Ljubija, and Radovan	5,000
Lead-zinc ore		Energoinvest	Mine and mill at Srebrenica	300
Manganese ore		Mangan-Energoinvest	Mine and concentrator at Buzim	100
Petroleum, refined	thousand barrels per day	Energoinvest: Rafinerija Nafte Bosanski Brod	Refinery at Bosanski Brod	100
Pig iron		RMK Zenica	Four blast furnaces at Zenica	2,250
Do.		do.	Two blast furnaces at Vares	100
Do.		do.	Electric reduction furnaces at Iljas	100
Salt	cubic meters per year	Hemijski Kombinat "Sodaso," Rudnik Soli i Solni Bunari	Rock salt mines at Tusanj	120,000
Do.	do.	do.	Production from brine at Tuzla	2,000,000
Steel, crude		BH Steel-Zeljezara (former RMK Zenica)	Plant at Zenica	2,060

TABLE 5
CROATIA: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/		1998	1999	2000	2001	2002
METALS						
Aluminum:						
Bauxite e/		--	--	--	--	-- 3/
Metal, ingot, primary and secondary		16,112	14,461	15,050	16,019	-- 3/
Alloys		2,191	843	977	823	812 3/
Semimanufactures, rolled		26,148	29,465	30,161	34,106	33,774 3/
Ferrochromium		11,771	--	15,753	361	-- 3/
Steel:						
Crude, from electric furnaces		104,854	77,213	71,021	57,993	33,851 3/
Semimanufactures:						
Bars and wire rod		42,357	46,665	42,388	31,583	2,078 3/
Strip, narrow and wide		--	--	--	--	-- 3/
Seamless tubes		56,637	40,719	36,432	35,297	23,435 3/
Welded pipe		63,844	44,873	26,405	39,935	37,509 3/
INDUSTRIAL MINERALS						
Cement	thousand tons	2,294	2,712	2,852	3,246	3,378 3/
Clays:						
Bentonite		7,581	8,441	10,013	10,580	11,204 3/
Ceramic clay e/		5,022	6,000	6,100	6,000	6,000
Fire clay, crude e/		3,500	3,000	--	--	--
Gypsum:						
Crude		107,800	137,991	150,765	130,861	145,000 3/
Calcined		1,259	1,236	1,176	1,217	1,200
Lime	thousand tons	216	198	220	253	269 3/

See footnotes at end of table.

TABLE 5--Continued
CROATIA: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/		1998	1999	2000	2001	2002
INDUSTRIAL MINERALS--Continued						
Nitrogen, N content of ammonia	thousand tons	248	306	328	263	249 3/
Pumice and related materials, volcanic tuff	do.	38	55	38	42	41 3/
Quartz, quartzite, glass sand		245,855	211,572	211,705 r/	252,013 r/	274,121 3/
Salt, all sources		24,087	18,477	33,668	32,585	36,885 3/
Sand and gravel, excluding glass sand	thousand cubic meters	4,316	3,644	3,480	3,865 r/	4,353 3/
Stone, excluding quartz and quartzite, dimension stone, crude:						
Ornamental	square meters	1,138,728	1,155,281	1,063,901 r/	1,044,944	1,127,948 3/
Crushed and brown, n.e.s.	thousand tons	11,360	11,871	10,801	12,941	14,736 3/
Other e/	cubic meters	20,000	20,000	25,000	25,000	25,000
Sulfur, byproduct of petroleum e/		15,000	15,000	15,000	15,000	15,000
MINERAL FUELS AND RELATED MATERIALS						
Carbon black		22,165	17,589	20,029	21,180	20,000
Coal, bituminous	thousand tons	51	15	--	--	-- 3/
Natural gas, gross production	million cubic meters	1,570	1,551	1,659 r/	2,010	2,122 3/
Petroleum, crude:						
As reported	thousand tons	1,389	1,293	1,214	1,121	1,108 3/
Refinery products		5,183,000	5,639,000	5,322,000	5,400,000	5,300,000

e/ Estimated; estimated data are rounded to no more than three significant digits. r/ Revised. -- Zero.

1/ Table includes data available through May 2003.

2/ In addition to commodities listed, common clay also was produced, but available information was inadequate to make reliable estimates of output levels.

3/ Reported figure.

TABLE 6
CROATIA: STRUCTURE OF THE MINERALS INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies	Location of main facilities	Annual capacity
Alumina		Jadral, Jadranski Aluminijum	Jadral Alumina Plant	150
Aluminum		Boris Kidric Tvornica Lakih Metala	Smelter at Sibenik	75
Do.		Top-Tvornica Olovni i Aluminjskikh	Semimanufactures producer at Savska	NA
Bauxite		Jadral, Jadranski Aluminijum	Mines in at Obrovac, Drnis, and other locations	450
Coal, bituminous		Istarski Ugljenokopi Rasa	Mines at Labin and Potpican	500
Cement		Dalmacija Cement	Sv. Jurai plant at Kastel Sucurac	1,300
Do.		do.	Sv. Kajo plant at Solin	750
Do.		do.	Majdan plant at Solin Majdan	780
Do.		Istra Cement International D.D.	Plant at Pula	70
Do.		Tvornica Cementa Koromacno	Plant at Koromacno	420
Do.		Tvornica Cementa Umag D.D.	Cement plant at Umag	480
Do.		Nasicecement D.D.	Nacise plant at Tajnovac	840
Natural gas	million cubic feet	do.	Main natural gasfields at Bogsic Lug, and Molve	70,000
Petroleum, crude	thousand barrels per day	Industrija Nafte d.d. Zagreb (INA)	Oilfields in Croatia and Slovenia: Benicanci, Zutica, Struzec, Ivanic Grad, Lendava, and other locations	70
Do.	do.	do.	Refineries at Urinj and Rijeka	160
Do.	do.	do.	Refinery at Sisak	150
Pig iron		Zeljezara Sisak d.d.	Two blast furnaces at Sisak	235
Salt	cubic meters	Solana Pag, Solana Ante Festin	Marine salt: Pag Island	13
Steel, crude		Zeljezara Sisak d.d.	Plant at Sisak	401
Do.		Jadranska Zelejzara Split	Plant at Split	120

NA Not available.

TABLE 7
MACEDONIA: ESTIMATED PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity 3/		1997	1998	1999	2000	2001
METALS						
Aluminum, metal, ingot, primary and secondary		4,000	5,850 4/	5,000	4,500	4,000
Cadmium, smelter output	kilograms	50 4/	50	50	50	50
Chromite:						
Ore, gross weight		5,000	--	--	--	-- 4/
Concentrate (produced largely from imported ores)		3,000	--	--	--	-- 4/
Copper, mine and concentrator output:						
Ore:						
Gross weight	thousand tons	2,000	2,000	2,000	2,000	1,500
Cu content		8,000 4/	9,100 4/	10,200 r/	10,000	7,000
Concentrate:						
Gross weight		20,000	20,000	20,000	5,000	20,000
Cu content		13,000	9,100	9,000	6,000	9,000
Gold	kilograms	650	700	750 r/	750	500
Iron and steel:						
Iron ore:						
Gross weight		20,000	20,000	20,000	20,000	20,000
Fe content		1,000	1,000	1,000	1,000	1,000
Concentrate		15,000	15,000	15,000	15,000	10,000
Pellets		10,000	10,000	10,000	10,000	10,000
Agglomerate		5,000	5,000	5,000	5,000	5,000
Metal:						
Ferroalloys:						
Ferrochromium, low C		460 4/	-- 4/	-- 4/	--	--
Ferronickel, 38% Ni, gross weight		7,900	9,500 r/	5,000 4/	--	--
Ferrosilicon		55,000	96,700 r/	73,000	65000	60,000
Silicon		1,000	1,000	--	--	--
Total		64,400	107,200 r/ 4/	78,000	65,000	60,000
Steel, crude		30,000	-- r/	-- 4/	--	
Semimanufactures		60,000	65,000 r/	60,000	60,000	55,000
Lead:						
Mine output:						
Ore, gross weight, Pb-Zn ore		850,000	867,182 r/ 4/	670,000	850,000	600,000
Pb content		28,000	26,000	26,000 4/	26,000	11,000
Concentrate, Pb content		17,000	14,328 r/ 4/	12,300 r/ 4/	16,500	9,000
Primary and secondary:						
Smelter		20,000	20,000	20,000	20,000	8,000
Refined		26,046 r/ 4/	28,415 r/ 4/	19,738 r/ 4/	22,900	7,000
Nickel, metal, Ni content of FeNi		5,300 r/	5,800 r/	1,900 4/	--	--
Silver	kilograms	18,760 r/ 4/	20,000	22,000 r/	20,000	15,000
Zinc:						
Concentrate		15,800 r/	14,328 r/ 4/	8,000	12,200	5,000
Metal:						
Refined, primary and secondary:						
Smelter		7,000	7,000	7,000	7,000	7,000
Electrolytic		53,000	57,162 r/ 4/	49,608 r/ 4/	62,800	16,000
INDUSTRIAL MINERALS						
Cement	thousand tons	500 4/	461 r/ 4/	520 4/	585	450
Clays, bentonite		30,000	30,000	30,000	30,000	25,000
Diatomite		5,000	5,000	5,000	5,000	5,000
Feldspar		--	8,137 r/ 4/	11,000	10,000	8,000
Gypsum:						
Crude		25,000	25,000	25,000	25,000	20,000
Calcined		5,000	5,000	5,000	5,000	3,000
Lime		10,000 r/	924 r/	-- 4/	1,000	500
Pumice and related materials, volcanic tuff		100,000	100,000	150,000	150,000	50,000
Sand and gravel, excluding glass sand	thousand cubic meters	130	130	150	150	100
Stone, excluding quartz and quartzite, dimension, crude:						
Ornamental	square meters	190,000	190,000	200,000	200,000	150,000
Crushed and brown, n.e.s.	thousand cubic meters	400	400	400	400	300
Other	cubic meters	10,000	10,000	10,000	10,000	5,000

See footnotes at end of table.

TABLE 7--Continued
MACEDONIA: ESTIMATED PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity 3/		1997	1998	1999	2000	2001
INDUSTRIAL MINERALS--Continued						
Sulfur, byproduct of metallurgy	thousand tons	20,000	20,000	29,000	26,000	20,000
Talc:						
Crude		10,000	10,000	9,000	10,000	7,000
Washed		7,000	7,000	7,000	7,000	5,000
MINERAL FUELS AND RELATED MATERIALS						
Lignite	thousand tons	7,165 r/ 4/	8,180 r/	7,500	7,100	6,000
Petroleum refinery products	thousand 42-gallon barrels	6,000 r/	6,000	6,000	6,000	6,000

r/ Revised. -- Zero.

1/ Estimated data are rounded to no more than three significant digits; may not add to totals shown.

2/ Table includes data available through July 2002.

3/ In addition to commodities listed, common clay also is produced, but available information was inadequate to make reliable estimates of output levels

4/ Reported figure.

TABLE 8
MACEDONIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity e/
Cement	Azbestcementa "Usje" Preduzece za Proizvodnju Cementa	Plant at Skopje	2,190
Chromite, concentrate	Jugohrom, Hemijsko-Elektrometakurski Kombinat (HEK)	Concentrator at Radusa	150
Copper ore	Bucim, Rabotna Organizacija za Rudarstvo i Metalurgija za Baker	Mine and mill at Bucim, near Radovis	7,000
Ferroalloys	Jugohrom, Hemijsko-Elektrometalurski Kombinat (HEK)-Jegunovce	Plant at Jegunovce	80
Iron ore	Skopje, Rudnici i Zeljezarnica Skopje	Mines at Tajmiste, Demir Hisar, and Damjan	1,000
Lead and zinc, ore	Prepobotuvacki, Kombinat Zletovo-Sasa: Sase, Rudnici za Olovo i Cink	Mine and mill near Kamenica	300
Do.	Zletovo, Rudnici za Olovo i Cink	Mine and mill near Probistip	700
Lead, metal	Zletovo, Topilnica za Cink i Olovo	Imperial smelter at Titov Veles	40
Do.	do.	Refinery at Titov Veles	40
Nickel: 1/			
Ore	Feni-Rudnici i Industrija za Nikel, Celik i Antimon	Mine and opencast mine near Kavadarci	2,300
Metal	do.	Ferronickel plant at Kavadarci	161
Pig iron	Skopje, Rudnici i Zeljezarnica Skopje	Five Elkem electric furnaces at Skopje	430
Steel, crude	do.	Plant at Skopje	980
Zinc, metal	Zletovo, Topilnica za Cink i Olovo	Imperial Smelter plant and refinery at Titov Veles	65

e/ Estimated; estimated data are rounded to no more than three significant digits.

1/ Nickel in ferronickel.

TABLE 9
SERBIA AND MONTENEGRO: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/		1997	1998	1999	2000	2001
METALS						
Aluminum:						
Alumina, calcined, gross weight		160,000	152,619	156,012	186,135 r/	200,660
Bauxite, gross weight		470,000	226,000	500,000	630,000	610,000
Metal, ingot, primary and secondary		65,743	60,090	72,505	88,151	100,176
Antimony, metal		--	--	--	--	--
Bismuth, metal	kilograms	20 e/	430	--	--	--
Cadmium	do.	80,000 e/	17,320	--	--	--
Copper:						
Mine and concentrator output:						
Ore:						
Gross weight	thousand tons	20,507	19,939	15,975	12,896	7,123
Cu content		82,500	84,627	62,777	52,000 e/	28,000 e/
Concentrate:						
Gross weight		361,000	372,103	272,172	200,000 e/	120,000 e/
Cu content		73,600	70,900 e/	51,700	41,000 e/	22,000 e/
Metal:						
Blister and anodes:						
Primary		59,000 e/	101,000	54,000	45,000 e/	34,000 e/
Remelted		60,000 e/	101,925	49,782	45,000 e/	35,000 e/
Total		119,000 e/	202,925	103,782	90,000	69,000
Refined:						
Primary		70,534	54,000	49,902 r/	45,632	32,365
Remelted		43,000	40,396	1,902	40,000 e/	30,000 e/
Total		113,534	94,396	51,804	95,632 e/	62,365 e/
Gold, refined	kilograms	4,000	2,684	1,260	1,121 r/	800 e/
Iron and steel:						
Ore and concentrate, agglomerate		25,000	5,125	2,088	-- r/	--
Metal:						
Ferroalloys, ferronickel		6,500 e/	1,215	--	--	--
Pig iron		907,000	825,916	134,882	563,000	461,000
Crude steel		979,000	948,314	226,240	682,000	598,000
Semimanufactures		1,460,000	1,740,000	334,000 r/	880,000 r/	801,000
Lead:						
Mine and concentrate output:						
Ore, gross weight (Pb-Zn ore)		1,049,000	1,248,852	884,000 r/	1,302,000 r/	926,000
Pb content of ore e/		27,000	24,750 3/	18,000	26,000	19,000
Concentrate, gross weight e/		31,000	32,691 3/	26,000	38,000	27,000
Pb content of concentrate e/		11,000	12,000	9,000	14,000	10,000
Metal, primary and secondary:						
Smelter		41,000	35,576	-- r/	1,500 r/	--
Refined		23,632	23,756	--	1,242	--
Magnesium, metal		2,500 e/	3,965	1,203	2,600 e/	1,700 e/
Nickel, metal, Ni content of ferronickel		2,440	466	--	--	--
Platinum-group metals:						
Palladium	kilograms	55 e/	54	21	21 e/	10
Platinum	do.	3 e/	3	3	3 e/	1
Selenium	do.	38,000 e/	40,866	20,080	20,000 e/	20,000
Silver	do.	42,640	34,474	7,643	9,068 r/	5,745
Zinc:						
Zn content of Pb-Zn ore		25,000 e/	20,285	19,000 r/ e/	29,000 e/	20,000 e/
Concentrator output, gross weight		35,000 e/	40,530	34,000 e/	50,000 e/	35,000 e/
Zn content of concentrate		13,000	14,000	20,000 e/	30,000 e/	20,000 e/
Refined		29,454	14,415	683	8,291	13,467
INDUSTRIAL MINERALS						
Asbestos fiber, all grades		765	1,452	361	563	194
Cement	thousand tons	2,011	2,253	1,575	2,117	2,418

See footnotes at end of table.

TABLE 9--Continued
SERBIA AND MONTENEGRO: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/	1997	1998	1999	2000	2001
INDUSTRIAL MINERALS--Continued					
Clays:					
Bentonite	100 e/	68	77	75 e/	75 e/
Ceramic clay	35,000 e/	40,033	29,420	30,000 e/	30,000 e/
Fire clay:					
Crude	51,000	45,319	25,766	30,000 e/	30,000 e/
Calcined e/	10,000	10,000	4,000	10,000 e/	10,000 e/
Kaolin, crude	60,000 e/	75,092	40,321	39,475 r/	40,000 e/
Feldspar, crude	4,880	4,280	3,453	4,254 r/	4,000 e/
Gypsum, crude	32,124	27,778	33,962	46,651 r/	45,000 e/
Lime thousand tons	460	480	381	499 r/	467
Magnesite:					
Crude do.	98	949	31	41	36
Caustic calcined	6,327	7,044	2,000	3,000 e/	2,500 e/
Mica, all grades	200 e/	247	229	230 e/	230 e/
Nitrogen, N content of ammonia	235,000	166,152	75,788	60,000 e/	65,900
Pumice and related volanic materials, volcanic tuff	120,000 e/	120,000	50,000	120,000 e/	100,000 e/
Quartz sand thousand tons	366	353	253	418	301
Salt, all sources	28,000	78,148	63,834	78,277	61,646
Sand and gravel excluding glass sand thousand cubic meters	2,351	3,060	2,006	2,675 r/	1,967
Sodium compounds:					
Caustic soda	64,713	63,344	13,720	7,415	7,984
Sodium sulfate	5,000	1,896	1,321	800 e/	800
Stone, excluding quartz and quartzite, dimension, crude:					
Ornamental square meters	206,000	258,000	157,000 r/	158,000 r/	84,000
Crushed and broken, n.e.s. thousand cubic meters	2,665	3,085	1,937	3,000 e/	3,000 e/
Other, stone blocks cubic meters	9,817	1,630	786	1,000 e/	1,000 e/
Sulfur, byproduct: e/					
Metallurgy thousand tons	100	100	100	100 e/	100
Petroleum do.	1	1	1	1 e/	1
Total do.	101	101	101	101	101
MINERAL FUELS AND RELATED MATERIALS					
Coal:					
Bituminous do.	92	105	49	88	70
Brown do.	512	390	413	398	376
Lignite do.	42,313	43,577	30,967	33,638	31,789
Total do.	42,917	44,072	31,429	34,124	32,235
Natural gas, gross production million cubic meters	688	731	143 r/	160 r/	111
Petroleum:					
Crude, as reported thousand tons	979	913	705	805	746
Refinery products do.	3,167 r/	2,549 r/	1,047 r	1,100 e/	2,000 e/

e/ Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. r/ Revised. -- Zero.

1/ Table includes data available through March 2002.

2/ In addition to commodities listed, common clay and diatomite also are produced, and tellurium may be recovered as a copper refinery byproduct, but available information is inadequate to make reliable estimates of output levels.

3/ Reported figure.

TABLE 10
SERBIA AND MONTENEGRO: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand of metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity
Alumina	Kombinat Aluminijuma Titograd	Plant at Titograd, Montenegro	200.
Aluminum	do.	Smelter at Titograd, Montenegro	100.
Antimony, ores and concentrates	Zajaca, Rudarsko Tapionicarski Bazen	Mines and mills near Zajaca, Serbia	80.
Do.	do.	Mines and mill at Rajiceva Gora, Serbia	300.
Antimony, metal	do.	Smelter at Zajaca, Serbia	4.
Bauxite	Rudnici Boksita, Niksic	Mines in Montenegro at Kutsko Brdo, Zagrad, Biocki Stan, Durakov Dol, and and other locations	650.
Coal:			
Bituminous	Ibarski Rudnici Kamenog Uglja	Mines at Jarando and Usce, near Baljevac na Ibru, Serbia	250.
Lignite	SOUR Kolubara, Rudarsko Energetsko Industrijski Kombinat, RO	Opencast mines: Polje B and Polje D	10,000.
Do.	Kolubara Povrsinski Kopovi	Tamnavski Kopovi (also known as Kolubarski Rudnici Lignita) near Vreoci, Serbia	14,000.
Do.	SOUR Elektroprivreda Kosova, RO Kosovo, Proizvodnja Separacija i Transport Uglja	Opencast mines: Dobro Selo and Belacevac near Obilic, Serbia	2,000.
Cement	Becinska Fabrika Cementa	Plant at Beocin, Serbia	2,031.
Do.	Fabrika Cementa Novi Popovac	Plant at Popovac, Serbia	1,613.
Copper	Rudarsko Topionicki Bazen Bor	Smelter at Bor, Serbia	180.
Do.	do.	Electrolytic refinery at Bor, Serbia	180.
Do.	do.	Mine and mill at Bor, Serbia	5,000 ore.
Do.	do.	Mine and mill at Majdanpek, Serbia	15,000 ore.
Do.	do.	Mine and mill at Veliki Krivelj, Serbia	8,000 ore.
Lead-zinc ore	Rudarsko-Metalursko-Hemijski Kombinat za Olovo i Cink Trepca	Mines at Ajvalija, Kopanaonik, Badovac; Trepca, Blagodat, Lece; Veliki Majdan, Tisovak; and Kisnica, Rudnik, Suplja Stijena	5,000.
Do.	do.	Mills at Kriva Feja, Lece, Rudnik, Badovac, Leposavic, Zvecan, and Maravce, Suplja Stijena	3,160.
Do.	Hemijska Industrija Zorka: Brskovo, Rudnici Olova i Cinka	Mine at Brskovo, Montenegro	500.
Do.	Veliki Majdan Rudnik Olova i Cinka	Mine at mill near Krupanj, Serbia	250.
Lead, metal	Rudarsko Metalursko Hemijski Kombinat za Olovo i Cink Trepca	Smelter at Zvecan, Serbia	180.
Do.	do.	Refinery at Zvecan, Serbia	90.
Magnesite, concentrate	Rudnici Magnezita "Sumadija"	Mine and plant at Sumadija, 20 kilometers northwest of Cacak, Serbia	120.
Do.	Rudnik i Industrija Magnezita "Strezovce"	Open cast mine at Beli Kamen, Strezovce, near Itiova Metrovica, Serbia	300.
Do.	do.	Sinter plant at Strezovce	40.
Do.	Magnohrom, Rudnik Magnezita "Magnezit"	Mine at Bela Stena, Baljevac na Ibru, Serbia	30.
Natural gas million cubic feet	Naftaplin (Naftagas), RO za Istrazivanje, i Prozvodnju Nafte i Gasa	Natural gasfields in Serbia Kinkinda and others	30,000.
Petroleum:			
Crude thousand 42-gallon barrels per day	Naftagas, Naftna Industrija	Oil fields in Serbia: Kikinda and others	30.
Refined do.	Naftagas, Naftna Industrija: Rafinerija Nafte Pancevo	Refinery at Pancevo, Serbia	110.
Do. do.	Naftagas, Naftna Industrija: Rafinerija Nafte Novi Sad	Refinery at Novi Sad, Serbia	28.
Pig iron	Metalurski Kombinat, Smederevo	Blast furnace at Smederevo, Serbia	720.
Steel, crude	do.	Plant at Smederevo, Serbia	600.
Zinc, metal	Rudarsko Metalursko Hemijski Kombinat Olova i Cinka Trepca, Metalurgija Cinka	Electrolytic plant at Titova Metrovica, Serbia	40.
Do.	Hemijska Industrija Zorka	Electrolytic plant at Sabac, Serbia	40.

TABLE 11
SLOVENIA: APPARENT PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity		1997	1998	1999	2000	2001
METALS						
Aluminum, ingot, primary and secondary		74,400	73,803	77,200	83,800 r/	76,632 3/
Iron and steel, metal:						
Ferroalloys:						
Ferrochromium		9,232	10,621	560	--	--
Ferrosilicocalcium		200	200	200	200	100
Ferrosilicon		10,000	10,000	8,000	9,000	9,000
Crude steel from electric furnaces		372,700 r/	405,210	405,000	519,000 r/	500,000
Semimanufactures		380,000 r/	397,000 r/	418,000 r/	466,000 r/	450,000
Lead:						
Smelter, secondary e/		7,000	7,000	5,800	6,000	5,000
Refined, secondary		15,000	14,000	14,100 r/	15,300 r/	15,400 3/
Pb semimanufactures, rolled		300	300	300	300	300
INDUSTRIAL MINERALS						
Cement	thousand tons	1,113	1,149	1,224 r/	1,300	1,300
Clays:						
Ceramic clay, crude		2,500	2,500	2,500	2,500	2,500
Kaolin, crude		10,000	10,000	10,000	10,000	10,000
Lime	thousand tons	140	150	150	150	150
Pumice and related materials, volcanic tuff e/		40,000	40,000	40,000	40,000	40,000
Quartz, quartzite, glass sand:		210,000	210,000	210,000	210,000	200,000
Salt, all sources		5,000	5,000	5,000	5,000	2,000
Sand and gravel, excluding glass sand	thousand tons	10,412 r/	10,292 r/	12,419 r/	12,526 r/	12,500
Stone, excluding quartz and quartzite, crude: e/						
Dimension		82,000	91,000	104,000	78,000 r/	80,000
Other	cubic meters	3,000	3,000	3,000	3,000	3,000
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Brown coal	thousand tons	812	827	758	737 r/	685 3/
Lignite	do.	4,163	4,100	3,804	3,743 r/	3,448 3/
Natural gas	thousand cubic meters	12,100	12,500	5,700 r/	6,800 r/	6,100 3/
Petroleum, crude		1,100	900	800 r/	600 r/	700 3/

e/ Estimated; estimated data are rounded to no more than three significant digits. r/ Revised.

1/ Table includes data available through March 2002.

2/ In addition to commodities listed, common clay, coke, and petroleum products also were produced, but available information is inadequate to make reliable estimates of output levels.

3/ Reported figure.

TABLE 12
SLOVENIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies	Location of main facilities	Annual capacity
Alumina		Talum d.o.o.	Plant at Kidricevo	120
Aluminum		do.	Smelter at Kidricevo	72
Coal:				
Brown		SOZC, Rudarsko Energetski Kombinat E. Kardelj, Trobovlje, Slovenia	Mines: Sasavski Rudnici at Trbovlje, Hrastnik, Ojstro, Senovo, and Kanizarnica	1,300
Lignite		Rudarsko Energetski Kombinat Velenje, RO Rudnik Lignita-Velenje	Mine at Velenje	5,000
Cement		Salonit Anhovo	Plant at Anhovo	1,120
Lead metal		Rudnik Svinca in Topilnica, Mezica	Smelter at Mezica	35
Do.		do.	Refinery at Mezica	30
Petroleum, refined	thousand 42-gallon barrels per day	Industrija Nafte (INA) Refinerija Nafte Lendava	Refinery at Lendava	16
Pig iron		Zdruzeno Podjetje Slovenske Zelezarne	Two blast furnaces at Zelazara Jesenice	300
Do.		Zelezara Store	Electric reduction furnaces at Store pri Celju	290
Steel, crude		Zdruzeno Podjetje Slovenske Zelezarne	Plant at Jesenica	500
Do.		do.	Plant at Ravne	162
Do.		do.	Plant at Store	140

THE MINERAL INDUSTRY OF

AUSTRIA

By Harold R. Newman

Although the mining industry has maintained a long tradition in Austria, the metal mining sector has declined during the past few years owing principally to high operating costs, low ore grades, environmental problems, and increased foreign competition. This was not the case with the industrial minerals sector, which produced a number of important minerals. Austria was considered to be a significant producer of graphite and talc (table 1).

Because of Austria's dependence on foreign trade, its economy was closely linked to the economies of other European Union (EU) member states, particularly Germany. Foreign trade and investment ties with Central European and Eastern European countries played an increasingly important role.

As a result of EU liberalization directives, the Government has moved ahead with privatization legislation in the telecom and energy sectors. The Government was removing many of Austria's restrictions on business and was intent on privatizing state-owned companies. After completing a 10-year privatization program in 1997, the Government introduced another privatization plan in 2000 that included state-owned industries involved in the production of aluminum, petroleum, and steel. In 2001, the Government was reviewing full privatization of its shareholdings in the partly privatized companies Osterreichische Mineralolverwaltung AG (OMV) in petroleum, Voest-Alpine Stahl GmbH in steel, and Voest-Alpine AG in technology (Organisation for Economic Co-operation and Development, 2001§[1]).

During the past several years, the Austrian mineral industry had turned away from base-metal mining. Except for the iron ore operation at Erzberg and the tungsten operation at Mittersill, all the metal mines were closed. Most growth in the mineral resources area was in the private sector production of industrial minerals. Although partial privatization of state-owned industries was underway, a portion of the mineral industry was still under Government control (table 2).

Treibacher Alloymet AG used to make a wide range of ferroalloys, but only ferrovanadium and ferromolybdenum were made in significant quantities in 2001. The main product was ferrovanadium oxide. About 90% of production of both commodities was exported to European tool and high-speed steelmakers. Treibacher was developing a new product called Molyquick® that is more homogeneous than standard molybdenum. Because it is made in briquettes, fewer are fines. It has a lower density and dissolves faster in the steel melt (Buchanan, 2001).

Voest-Alpine Schienen (a subsidiary of Voest-Alpine Stahl AG) announced it would spend $11.7 million to increase the long rail capacity of its Donawitz works to 200,000 metric tons per year (t/yr) from 140,000 t/yr by September 2002. Voest-Alpine Schienen defined long rails as being more than 60 meters (m) in length and ultra-long rails as being more than 100 m in length. The company estimated that 540,000 t/yr of rail is consumed in Europe in 2001. Central European countries, most of which hoped to join the EU, were expanding their grids of high-speed transit railways. Ultralong rails accounted for about 40% of total production (Metal Bulletin, 2001).

The Erzberg Mine of Voest-Alpine Erzberg GmbH produced a beneficiated iron ore that was shipped by rail to the nearby steel mills of Voest-Alpine Stahl for further beneficiation and production of self-fluxing sinter that averaged 50% iron and 3% manganese.

Wolfram Bergbau und Hütten GmbH operated the Western World's largest underground tungsten mine at Mittersill and a tungsten conversion plant at Bergla.

Treibacher Schleifmittel AG, which was the world's largest manufacturer of fused alumina in 2001, expanded its presence in Central Europe with the acquisition of Chemicke Zavody Sokolov (CHZS) of the Czech Republic. CHZS produced about 10,000 t/yr of white fused alumina, mostly in lump form, for the refractories industry. Treibacher announced that it intended to make improvements to the plant's production capabilities (Industrial Minerals, 2001). Ample supplies of calcite, dolomite, and limestone were available to support a viable cement industry in Austria. The market was relatively fragmented; only two of the five major producing companies had more than one plant.

Grafitbergbau Kaiserberg AG operated open pit mines at Kaisersberg and Trieben. Grafitbergbau's 30,000-t/yr-capacity processing plant at Kaisersberg composed drying, classification, milling, flotation, and fine grinding sections (table 1).

Austrian salt mines were owned by the Government and regulated by the Ministry of Finance. Exploration, production, and trade were controlled by Österreichische Salinen GmbH. All salt output was from three underground mines and one brine well in central Austria. The Government was proceeding with plans to privatize the operations.

Luzenac Naintsch AG, which was the only producer of talc in Austria, operated three mines in the Styria region and produced a range of talc, chloritic talc, dolomite talc, and chlorite-mica-quartz ores.

The open pit Oberdorf Mine of Graz-Koflacher Eisenbahn und Bergbaugesellschaft GmbH was the only lignite mine with any significant production.

Because of Austria's long history of minerals exploration and a strong mining tradition, geologic conditions are fairly well known. Future mining activities will most likely be concentrated in industrial minerals, mainly for domestic consumption. The chances of finding new and workable base-metal deposits are probably small.

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[1] A reference that includes a section twist (§) is found in the Internet Reference Cited section.

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Major Source of Information

Bundesministerium für Wirtschaft und Arbeit
Denisgasse 31
1200 Vienna, Austria

TABLE 1
AUSTRIA: PRODUCTION OF MINERAL COMMODITIES 1/

(Thousand metric tons unless otherwise specified)

Commodity		1997	1998	1999	2000	2001 e/
METALS						
Aluminum, metal, secondary	tons	118,800	116,500	143,000	158,100 r/	150,000
Copper, refined:						
Primary	do.	2,000 e/	1,000	5,000	1,000	1,000
Secondary	do.	74,000 e/	71,000	77,573	78,000 r/	68,000
Total	do.	76,000 e/	72,000	82,573	79,000 r/	69,000
Gold, metal e/	kilograms	100	100	100	100	50
Iron and steel:						
Iron ore and concentrate: e/						
Gross weight		1,800	1,797 2/	1,752 2/	1,850	1,800
Fe content		500	500	553 2/	590	575
Metal:						
Pig iron		3,965	4,022	3,913	4,318	4,375 2/
Ferroalloys, electric furnace e/		11	12	12	12	9
Crude steel		5,196	5,298	5,213	5,725	5,887 2/
Semimanufactures		4,516	4,640	4,657	5,035	5,251 2/
Lead, refined, secondary	tons	22,700	23,100	24,500 e/	24,000 e/	22,000
Manganese, Mn content of domestic iron ore e/	do.	25,000	24,000	20,000	20,000	18,000
Tungsten, mine output, W content of concentrate	do.	1,400	1,423	1,610	1,600 e/	1,600
INDUSTRIAL MINERALS						
Cement, hydraulic		3,852	3,789 r/	3,817 r/	3,799 r/	3,863 2/
Clays:						
Ilite		150 e/	186	190 e/	305	300
Kaolin:						
Crude		180 e/	298	152	119	125
Marketable e/		60	100 2/	50	50	50
Other e/		2,800	2,800	2,600	2,600	2,600
Graphite, crude	tons	12,000 e/	10,738	12,635	12,000 e/	12,000
Gypsum and anhydrite, crude		1,000 e/	961	999	946	1,000
Lime e/		2,000	2,000	2,000	2,000	2,000
Magnesite:						
Crude		650 e/	723	749	726	700
Sintered or dead-burned		300 e/	325	325	270 r/	300
Caustic calcined e/		60	60	60	60	60
Nitrogen, N content of ammonia e/	tons	400	400	450	450	460
Pigments, mineral, micaceous iron oxide e/	tons	7,500	7,000	6,000	6,000	5,000
Pumice (trass)	do.	6,000	6,137	4,272	3,961	4,000
Salt: e/						
Rock		1	1	1	1	1
In brine		400	400	400	400	400
Sand and gravel:						
Quartz sand		6,000 e/	6,329	6,857	6,985	7,000
Other sand and gravel e/		18,000	18,000	18,000	18,000	18,000
Total		24,000 e/	24,329	24,857 r/	24,985	25,000

See footnotes at end of table.

TABLE 1--Continued
AUSTRIA: PRODUCTION OF MINERAL COMMODITIES 1/

(Thousand metric tons unless otherwise specified)

Commodity	1997	1998	1999	2000	2001 e/
INDUSTRIAL MINERALS--Continued					
Sodium compounds, n.e.s., manufactured: e/					
Soda ash	200	150	150	150	150
Sulfate	100	100	100	100	100
Stone: 3/					
Dolomite	9,000 e/	8,978	7,968	7,152	7,200
Quartz and quartzite	282	398	409	372	375
Other:					
Limestone and marble	20,000 e/	20,000 e/	26,409	23,824	24,000
Basalt	647	5,075	5,201	4,933	5,000
Marl	2,000	1,364	1,423	1,559	1,600
Crushed stone e/	12,000	12,000	12,000	12,000	12,000
Total	34,647	38,439 r/	45,033 r/	42,316 r/	42,600
Grand total	43,929	47,815	53,410	49,840	50,175
Sulfur, byproduct of petroleum and natural gas tons	9,000 e/	9,000 e/	9,468	9,646	9,500
Talc and soapstone, crude do.	155,730	137,114	129,516	133,060	140,000
MINERAL FUELS AND RELATED MATERIALS					
Coal, brown and lignite	1,122	1,191	1,054	1,256	1,340 2/
Coke	1,567	1,500	1,596	1,384	1,411 2/
Gas, natural:					
Gross million cubic meters	1,400 e/	1,568	1,791	1,805	1,800
Marketed e/ do.	1,000	1,000	1,000	1,200	1,200
Oil shale tons	500 e/	500	496	440	400
Petroleum refinery products:					
Crude thousand 42-gallon barrels	7,200 e/	7,624	6,879	7,024	7,000
Refinery products:					
Liquefied petroleum gas do.	400 r/ e/	325	241	186	200
Gasoline do.	20,120	19,540	18,196	15,413	16,000
Kerosene and jet fuel do.	3,832	3,960	4,256	4,360	4,500
Distillate fuel oil do.	29,000 r/ e/	29,019	27,387	25,897	26,000
Residual fuel oil do.	9,623	9,710	8,521	6,325	6,000
Unspecified do.	8,000	8,393	8,673	14,748	15,000
Refinery fuel and losses do.	2,000 e/	4,781	5,497	5,149	5,000
Total do.	72,975 r/	75,728	72,771	72,078	72,700

e/ Estimated; estimated data are rounded to no more than three significant digits; may not add totals shown. r/ Revised.

1/ Table includes data available through March 2002.

2/ Reported figure.

3/ Excludes stone used by the cement and iron and steel industries.

TABLE 2
AUSTRIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Alumina, fused	Treibacher Schleifmittel AG	Plant at Villach	100
Aluminum	Aluminum Lend GmbH (Salzburger Aluminium AG, 100%)	Secondary ingot plant at Lend	25
Do.	Austria Sekundär Aluminium GmbH (Amag Austria Metall, 100%	Secondary ingot plant at Ranshofen	50
Cement	Lafarge Perlmooser AG (Lafarge France, 100%)	Plants at Mannesdorf and Retsnei and grinding plants at Kirchbichl	2,200
Do.	Wietersdorfer Zemenwerke	Plants at Peggau and Wietersdorf	1,000
Do.	Zementwerk Leube	Plant at Gartenau	700
Do.	SPZ Zemenwerke Eiberg	Plant at Eiberg	600
Do.	Gmundner Zement	Plant at Gmundner	580
Coal	Graz-Koflacher Eisenbahn und Bergbaugesellschaft GmbH (Government, 100%)	Oberdorf Mine	1,200

TABLE 2--Continued
AUSTRIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Copper	Austria Metall AG (Metal Mining Corp. of Canada, 41%; Mount Isa Mines of Australia, 41%; and Government, 18%)	Plant at Brixlegg	75
Ferroalloys (FeV, FeMo, FeNi)	Treibacher Alloymet AG (Treibacher Industries AG, 100%)	Plant at Treibach	10
Graphite	Industrie und Bergbaugesellschaft Pryssok & Co KG	Trandorf Mine at Mühldorf	15
Do.	Grafitbergbau Kaiserberg AG	Kaisersberg Mine	3
Do.	do.	Trieben Mine	3
Gypsum	Erste Salzburger Gipswerk-Gesellschaft Christian Moldan KG	Abtenau and Moosegg Mines	300
Do.	Rigips Austria GmbH	Grundlsee, Puchberg, Unterkainisch, and Weisenbach Mines	250
Do.	Knauf Gesellschaft GmbH	Hinterstein Mine	160
Iron ore	Voest-Alpine Erzberg GmbH (Government, 100%)	Erzberg Mine at Eisenerz	1,000
Lead	Bleiberg Bergwerks-Union AG (Metall Gesellschaft, 74%)	Smelter at Brixlegg	55
Magnesite	Veitsch-Radex AG	Mines at Breitenau, Hochfilzen and Radenthein	600
Do.	Radex Austria AG (Osterreichische Magnesit AG, 100%)	Millstatteralpe Mine	250
Natural gas million cubic meters	Osterreichische Mineralolverwaltung AG (Government, 100%)	Fields in Vienna Basin	1,500
Nitrogen, N content of ammonia	Agrolinz AG	Plant at Linz	498
Salt	Osterreichische Salinen GmbH (Government, 100%)	Mines at Bad Ischl	800
Steel	Voest-Alpine Stahl GmbH (Government, 100%)	Plants at Donawitz and Linz	4,500
Talc	Luzenac Naintsch AG	Mines at Lassing, Rabenwald, and Weisskirchen and plants at Oberfeistitz and Weisskirchen	160
Tungsten	Wolfram Bergbau und Hütten GmbH (Inmet Mining Corp., 100%)	Mittersill Mine at Felbertal, Salzburg, and conversion plant in Bergla	350

THE MINERAL INDUSTRIES OF

BELGIUM AND LUXEMBOURG

By Harold R. Newman

BELGIUM

The mineral-processing industry was a significant contributor to the Belgian economy in 2001. The refining of copper, zinc, and minor metals and the production of steel, all from imported materials, were the largest mineral industries in Belgium. The extraction and recovery of nonferrous metals were carried out in large-scale, high-technology plants. Europe's largest electrolytic copper and zinc refineries were in Belgium as was one of the continent's largest lead refineries. The country was also a significant producer of cadmium, germanium, selenium, and tellurium as byproducts from smelting and refining operations.

Although the country is small, Belgium has a significant industrial minerals sector. The country was an important producer of such industrial materials as carbonates, which included limestone, dolomite, silica sand, and construction materials, which included a wide range of different types of marble.

Environmental programs and policy in Belgium were the responsibility of the Federal Ministry of the Environment as well as its comparable ministries in Flanders and Wallonia, which are two separate regions of the country. Environmental programs ranged from treating oil effluent to reducing air pollution emissions.

Belgium was a major exporting country with a highly developed market economy and, in 2000 (latest year for which data are available), was ranked as the 12th largest trading nation in the world in terms of exports and imports, each equivalent to about 75% of gross national product; this made the country one of the highest per capita exporters in the world. It has a long history of reliance on international trade. Most of Belgium's trade went to other member states of the European Union (80%) and the United States (8%) (U.S. Bureau of Economic and Business Affairs, 2002).

On May 1, 1998, Belgium became a member of the European Monetary Union. Belgium will shift from the use of the Belgian franc (BF) to the use of the euro (€) as its currency by January 1, 2002. On January 1, 1999, the definitive exchange rate between the BF and the € was established at BF 40.3399 to € 1.0000 (U.S. Bureau of Economic and Business Affairs, 2002).

Belgium, the Netherlands, and Luxembourg (BENELUX) form the BENELUX customs unit. Since 1921, the economic union between Belgium and Luxembourg, which is known as the Belgium-Luxembourg Economic Union (BLEU), has involved the parity of currency, integrated foreign trade (including statistics), a balance-of-payments account, and a joint central bank. International trade data for Belgium are covered in the context of the BLEU and, as such, also covered the exports, reexports, and imports of Luxembourg. Other members of the EU were the BLEU's most important trading partners.

Production of mineral commodities generally remained stable during 2001. As in the past, any increases in production generally followed the lines of exported goods, such as value-added nonferrous metals (table 1).

Table 2 lists the principal mining and mineral-processing facilities in Belgium with their location and capacity. The only remaining active mining operations in Belgium in 2001 were for the production of sand and gravel and the quarrying of stone. Marble was an important export commodity. The metal-processing sector of the industry almost exclusively used imported raw materials, whether metal concentrates, scrap, or other materials, for smelting and refining or metal for forming and casting.

Belgium's Sudamin Holding purchased the antimony trioxide assets of French-based Mines de la Lucette. The deal will create a new company, Produits Chemique de la Lucette, and marks a move toward consolidation in the antimony trioxide industry. Campine S.A. thus became the only major European producer apart from the newly formed Produits Chemique. Lucette's magnesium hydroxide operation was excluded from the acquisition (Metal Bulletin, 2001c).

Umicore (formerly Union Minière) was one of the world leaders in the nonferrous metals sector. Umicore produced and marketed through its three business units: advanced materials, copper and precious metals, and zinc. Umicore's industrial activities covered smelting and refining, manufacturing, and recycling and provided base metals and semifinished products for other industries. Umicore's precious-metals facility recycled complex industrial intermediate materials and specific precious-metal-bearing scrap from catalyst, electronic, and photographic applications (Metal Bulletin, 2001a).

Umicore was to construct a copper leaching and electrowinning plant at its Hoboken operation that would boost copper refining capacity by 50,000 metric tons per year (t/yr). Combined copper refining capacity at Hoboken and Olen would be increased from 330,000 t/yr to 370,000 t/yr in 2003. All precious-metals-bearing blister copper produced at the precious-metal-recycling plant would be processed at Hoboken (Metal Bulletin, 2001d).

Sidmar NV was proceeding with the construction of the world's first industrial scale ironmaking plant that uses the Sidcomet process. The process, which was adapted from the Comet Resources Limited technology developed in Western Australia, reduces iron ore fines by using coal and fluxes in a rotary hearth furnace before being smelted in a separate electric arc furnace. Most other technologies require the use of more-expensive pellet and lump grades of iron ore; the use of ordinary coal gives the process a cost advantage over the blast furnace. Depending on the temperature employed in the reduction process, Sidcomet can produce as much as 50 metric tons of hot metal in 28 minutes. The 800,000-t/yr plant will help provide the hot metal required for Sidmar to meet its 6-million-metric-ton-per-year (Mt/yr) hot-rolling capacity (Metal Bulletin, 2001b).

According to the Diamond High Council, Belgium's total diamond turnover in 2000 (latest year for which data are available) grew by nearly 9% to a record $25.8 billion compared with nearly $24 billion in 1999. This included a 16% increase in polished sales overseas from $5.2 billion to $6.1 billion in 2000. There was a slight rise in exports to the United States, which remained the main destination, by taking almost 40% of Belgium's goods (Basel Magazine, 2001).

Belgium, which has been an important producer of marble for more than 2,000 years, was recognized for the diversity and quality of its dimension stone. The so-called petit granit, which is actually a dark blue-gray crinoidal limestone, was one of the most important facing stones the country produces. All the marble quarries are in Wallonia. Red, black, and gray are the principal color ranges of the marble, most of which was exported.

Zoutman Industries (formerly Eurasalt NV) started a new plant at Roeselare. The 200,000 t/yr plant produced all grades of sea salt for use in technical applications, human consumption, animal feed, and deicing. Zoutman, which was an independent salt producer, had production sites in Belgium, Poland, and South America (Zoutman Industries, April 2001§[1]).

When the last Belgian coal mines closed in 1992, the country became entirely dependent on imported primary energy. Belgium imported coal to meet the needs of the steel, cement, and power-generating industries and imported all its crude oil for its four petroleum refineries. Belgium's seven nuclear powerplants supplied more than one-half of its electricity needs. Natural gas, which was considered to be more environmentally acceptable as a fuel, has begun to play a more important role as an energy source. With Belgium at the center of the European gas grid, the country was favorably located for obtaining natural gas.

The seaport of Antwerp is an important link in the chain of international trade. Every year Antwerp's port operators handle almost 120 million metric tons of international maritime goods traffic. This makes Antwerp the fourth largest port in the world, the second largest port in Europe, and by far the largest port in Belgium. The port covers more than 14,055 hectares of land with 130 kilometers of berths, about one-half of which are suitable for deep draft ships. Antwerp is Europe's leading port for steel products. Bulk terminals, with specialized facilities, handle large volumes of china clay (kaolin), coal, fertilizers, iron ore, nonferrous ores, and quartz sand (Antwerp Port Authority, 2001§).

Corporate restructuring and the Government policy of budget cuts, which were split between the Federal Government and the regional authorities of Flanders and Wallonia, were expected to make Belgian products more competitive in the world market. The export-oriented Belgian industries relied heavily on the markets of its trading partners; when these partners' profits and cash flow increase, Belgium's economy will also experience positive results because it will be able to export more of its products.

LUXEMBOURG

In 2001, Luxembourg's mineral industry consisted principally of raw materials processing, information systems, and mineral trading.

As a member of the BLEU, trade statistics for Luxembourg are inextricably linked with those of Belgium and, therefore, cannot be listed individually. The iron and steel industry was Luxembourg's most important mineral industry sector; steel was the country's main export commodity.

Acieries Reunies de Burbach-Eich-Dudelang (ARBED) dominated the mineral industry and was the major producer of pig iron, crude steel, and stainless steel, all from imported material. The company specialized in the production of large architectural steel beams. The company was also involved in other areas of the economy, such as the cement and brickmaking industries. ARBED's domestic and foreign subsidiaries had interests in cement, copper foil production, engineering, mining, and in steelmaking and steel products.

Mining in Luxembourg was represented by small industrial mineral operations that produced material for domestic consumption. These minerals include dolomite, limestone, sand and gravel, and slate (table 1). Luxembourg's principal producers of mineral industry products are listed in table 2.

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Major Sources of Information

Institute National de Statistiques
Rue de Louvain 44
1000 Brussels, Belgium
Service Geologique de Belgique
Rue Jenner 13
1040 Brussels, Belgium
Service Central de la Statistique et des Études Economiques (STATEC)
6 Boulevard Royal
2013 Luxembourg

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[1] References that include a section twist (§) are found in the Internet References Cited section.

TABLE 1
BELGIUM AND LUXEMBOURG: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Country and commodity	1997	1998	1999	2000	2001 e/
BELGIUM 2/					
METALS					
Aluminum, secondary including unspecified metals e/	2,000	1,000	1,000	1,000	500
Arsenic, white e/	2,000	1,500	1,500	1,500	1,500
Bismuth, metal e/	800	700	700	700	700
Cadmium, primary	1,420	1,318	1,400 e/	1,148 r/	1,236 3/
Cobalt, primary e/	1,200	1,200	950	1,148 r/ 3/	1,200
Copper:					
Blister: e/					
Primary	2,000	--	--	--	--
Secondary	141,000	138,000	143,300 3/	144,700 r/ 3/	139,000 3/
Total	143,000	138,000	143,300 3/	144,700 r/ 3/	139,000 3/
Unwrought, total primary and secondary including alloys	467,494	482,992	485,000 e/	485,000 e/	475,000
Refined, primary and secondary including alloys	373,000	368,000	388,000 e/	423,100	425,000
Iron and steel:					
Pig iron	8,077	8,619	8,431	8,472	8,500
Ferroalloys, electric furnace, ferromanganese e/	25,000	20,000	-- r/	-- r/	--
Steel:					
Crude	10,738	11,617	10,931	11,635	12,000
Hot-rolled products	12,047	12,195	12,780	13,689	14,000
Lead, refined:					
Primary e/ 4/	84,400	74,300	82,900 3/	98,000	80,000
Secondary 5/	26,400	17,200	20,300	20,000	16,000
Total e/	111,000	91,500	103,200 3/	118,000	96,000
Selenium e/	250	200	200	200	200
Tin, metal, secondary including alloys e/	3,000	2,500	8,100	8,500	8,000
Zinc:					
Slab:					
Primary	213,600	205,000	230,500	224,000	230,000
Secondary (possibly remelted zinc) e/	30,000	30,000	28,000	28,000	30,000
Total e/	243,600 3/	235,000	259,000	252,000	260,000
Powder	36,000	30,000	30,000 e/	30,000 e/	25,000
INDUSTRIAL MINERALS					
Barite e/	30,000	40,000	30,000	30,000	30,000
Cement, hydraulic e/ thousand tons	8,052 3/	8,000	8,000	8,000	8,000
Clay, kaolin e/ do.	300	300	300	300	300
Lime and dead-burned dolomite, quicklime e/ do.	1,750	1,750	1,750	1,750	1,700
Nitogen, N content of ammonia do.	750 e/	756	850 e/	863	860
Sodium sulfate e/ do.	250	250	250	250	250
Stone, sand and gravel: e/					
Calcerous:					
Alabaster	1,151 3/	1,200	1,200	1,200	1,200
Dolomite thousand tons	3,466 3/	3,500	3,500	3,500	3,500
Limestone do.	30,000	30,000	30,000	30,000	30,000
Marble, in blocks	300	300	300	300	300
Marble, crushed and other cubic meters	100	100	100	100	100
Petit granite (Belgian bluestone):					
Quarried thousand cubic meters	1,200	1,200	1,200	1,200	1,200
Sawed do.	100,000	100,000	100,000	100,000	100,000
Worked do.	15,000	15,000	15,000	15,000	15,000
Crushed and other do.	800,000	800,000	800,000	800,000	800,000
Porphyry, all types thousand tons	4,000	4,000	4,000	4,000	4,000
Quartz and quartzite	500,000	500,000	500,000	500,000	500,000
Sandstone:					
Rough stone including crushed thousand tons	2,400	2,400	2,400	2,400	2,400
Paving	14,000	14,000	14,000	14,000	14,000
Sand and gravel:					
Construction sand thousand tons	9,000	8,500	8,500	8,500	8,500
Foundry sand	500,000	500,000	500,000	500,000	500,000
Dredged sand thousand tons	2,300	2,000	2,000	2,000	2,000
Glass sand do.	1,900	1,800	1,800	1,800	1,800
Other sand do.	2,800	2,800	2,800	2,800	2,800
Gravel, dredged do.	5,000	5,000	5,000	5,000	5,000

See footnotes at end of table.

TABLE 1--Continued
BELGIUM AND LUXEMBOURG: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Country and commodity	1997	1998	1999	2000	2001 e/
BELGIUM--Continued 2/					
INDUSTRIAL MINERALS--Continued					
Sulfur: e/					
Byproducts:					
Elemental	250,000	248,000	228,000	230,000 3/	230,000
Other forms	180,000	180,000	180,000	180,000 3/	180,000
Total	430,000	428,000	408,000	410,000 3/	410,000
Sulfuric acid, byproduct of petroleum	2,000	2,000	2,000	2,000	2,000
MINERAL FUELS AND RELATED MATERIALS					
Carbon black e/	1,500	1,000	1,000	1,000	1,000
Coke, all types e/ thousand tons	3,401 3/	3,400	3,400	3,400	3,400
Gas, manufactured e/ thousand cubic meters	372,095 3/	375,000	375,000	375,000	375,000
Petroleum refinery products:					
Liquefied petroleum gas thousand 42-gallon barrels	13,607	7,401 r/	6,113 r/	8,758 r/	9,000
Naphtha and white spirit do.	13,354	12,954 r/	13,656 r/	17,213 r/	16,000
Gasoline do.	57,979	54,672 r/	51,281 r/	45,152 r/	50,000
Jet fuel do.	16,000 r/ e/	17,536 r/	16,952 r/	18,544 r/	18,000
Distillate fuel oil do.	85,000 e/	92,698 r/	87,483 r/	93,086 r/	90,000
Refinery gas e/ do.	3,500	3,500	3,500	3,500	3,500
Residual fuel oil do.	51,244	49,384 r/	41,998 r/	49,557 r/	50,000
Bitumen e/ do.	5,766 3/	5,000	5,000	5,000	5,000
Other e/ do.	8,500	8,500	8,500	8,500	10,000
Refinery fuel and losses e/ do.	12,000	12,000	12,000	12,000	10,000
Total e/ do.	267,000 r/	264,000 r/	246,000 r/	261,000 r/	262,000
LUXEMBOURG 6/					
METALS					
Iron and steel, metal:					
Pig iron	437,000	--	--	--	--
Steel:					
Crude	2,580,000	2,478,000	2,427,000	2,571,000	2,570,000
Semimanufactures	2,466,000	2,517,000	2,775,000	3,019,000	3,020,000
INDUSTRIAL MINERALS					
Cement, hydraulic e/	650,000	650,000	600,000	600,000	600,000
Gypsum and anhydrite, crude e/	400	400	400	400	400
Phosphates, Thomas slag: e/					
Gross weight	500,000	475,000	475,000	475,000	475,000
P_2O_5 content	75,000	70,000	70,000	70,000	70,000

e/ Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. r/ Revised. -- Zero.

1/ Table includes data available through February 2002.

2/ In addition to commodities listed, Belgium produced a number of other metals and alloys, for which only aggregate output figures were available.

3/ Reported figure.

4/ Data not reported; derived by taking reported total lead out put plus exports of lead bullion less imports of lead bullion.

5/ Data represent secondary refined lead output less remelted lead. As such, the figures are probably high because they include some lead that was sufficiently pure as scrap that did not require remelting, but data are not adequate to permit differentiation.

6/ Construction materials such as dimension stone and sand and gravel are also produced, but the amounts are no longer reported and no basis exists for the formulation of reliable estimates of output levels.

TABLE 2
BELGIUM AND LUXEMBOURG: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
BELGIUM				
Cadmium, metal	metric tons	Umicore (Sté. Générale de Belgique, 50.2%)	Balen	1,800
Cement		Cimenteries CBR SA (Sté. Générale de Belgique)	Plants at Lixhe, Mons/Obourg, Harmignies, Marchienne, Ghent, and others	3,200
Do.		Ciments d'Obourg SA	Plants at Obourg and Thieu	2,800 1/
Do.		Compagnie des Ciment Belge (Ciments Francais)	Plant at Gaurain-Ramecroix	2,400
Total				8,400
Cobalt	metric tons	Umicore (Sté. Générale de Belgique, 50.2%)	Refinery at Olen	500
Copper		do.	Smelter at Antwerp-Hoboken	50
Do.		do.	Refinery at Olen	330
Do.		Metallo-Chimique NV	Smelter at Beerse	80
Dolomite		SA Dolomeuse (Group Lhoist)	Quarry at Marche les Dames	500
Do.		do.	Plant at Marche les Dames	750
Do.		SA de Marche-les-Dames (Group Lhoist)	Quarries at Namèche	3,000
Do.		do.	Plant at Namèche	3,000
Do.		SA Dolomies de Merlemont (Group Lhoist)	Quarry at Philippeville	100
Lead, metal		Umicore (Sté. Générale de Belgique, 50.2%)	Smelter at Antwerp-Hoboken	90
Do.		do.	Refinery at Antwerp-Hoboken	125
Limestone		Carmeuse S.A. (Long View Investment NV)	Mines and plant at Engis	1,850
Do.		do.	Mines and plant at Frasnes	450
Do.		do.	Mines and plant at Maizeret	850
Do.		do.	Mines and plant at Moha	800
Do.		SA Transcar (Royal Volker Stevin)	Mines and plant at Maizeret	850
Petroleum, refined	42-gallon barrels per day	Fina Raffinaderji Antwerp	Refinery at Antwerp	268,000
Do.	do.	SA Esso NV	do.	239,000
Do.	do.	Belgian Refining Corp.	do.	80,000
Do.	do.	Nynas Petroleum NV	do.	125,000
Total				712,000
Salt		Zoutman NV	Plant at Roeselare	200
Steel		Cockerill Sambre SA (Government of Wallonia, 80%)	Plants at Liège and Charleroi	5,000
Do.		Sidmar NV [Belgian Government 28.24%; Acieries Reunies de Burbach-Eich-Dudelang (ARBED), 71.76%]	Plant at Ghent	3,960
Do.		Usines Gustave Boël NV	Plant at La Louviere	2,020
Do.		Forges de Clabecq SA	Plant at Clabecq	1,500
Do.		SA Fabrique de Fer de Charleroi	Plant at Charleroi	600
Do.		ALZ NV	Plant at Genk-Zuid	360
Do.		New Tubemeuse (NTW) SA	Plant at Flemalle	300
Total				14,000
Zinc, metal		Umicore (Sté. Générale de Belgique, 50.2%)	Smelter and refinery at Balen	450
LUXEMBOURG				
Cement		SA des Ciments Luxembourgeois (ARBED, 50%; SGB, 25%)	Plant at Esch-sur-Alzette	450
Do.		Intermoselle SARL (ARBED, 33%)	Plant at Rumelange	1,000
Steel		Acieries Reunies de Burbach-Eich-Dudelang (ARBED) (Belgian Government, 31%; others)	Plants at Differdange, Dudelange, Esch-Belval, Esch-Schifflange	5,320

1/ Includes the capacity of the company SA Ciments de Haccourt.

THE MINERAL INDUSTRIES OF

BULGARIA AND ROMANIA

By Walter G. Steblez

Bulgaria and Romania form the northeastern part of the Balkan Peninsula, which borders the Black Sea to the east, Ukraine and Moldova to the north, Greece and Turkey to the south and southeast, Macedonia and Serbia and Montenegro to the west, and Hungary to the northwest. The Danube River forms a natural boundary between Bulgaria in the south and Romania in the north. Bulgaria is within the Mediterranean Alpine folded zone, which comprises the Carpatho-Balkan branch to the north and the Dinaric-Hellenic branch to the south (Bulgaria "References Cited" section Bogdanov, 1982, p. 215). The Carpatho-Balkan branch also constitutes the primary folded zone in Romania and incorporates the eastern and southern Carpathian Mountains and the Apuseni Mountains within the Carpathian arc to the west of the Transylvanian Plateau (Romania "References Cited" section Ianovici and Borcos, 1982, p. 55-58).

Mining and metalworking in this region has a long history that was well documented by Roman times when Bulgaria and Romania, known as Thrace and Dacia, respectively, were important sources of base and precious metals. Gold and nonferrous metals mined in this region remain attractive investment opportunities to foreign investors.

BULGARIA

Bulgaria's minerals industry included the mine output of ferrous and nonferrous metals, mineral fuels (mainly coal), and such industrial minerals as clays, gypsum, and rock salt. Additionally, enterprises in the metallurgical branch smelted and refined copper, gold, iron and steel, lead, silver, and zinc. Cement, dimension stone, and other construction materials also were produced. On a world scale, however, Bulgaria's minerals industry was small and only of regional importance. Although most of the country's minerals requirements were met through domestic production, the country continued to depend on imports of iron ore, steel, and mineral fuels.

Bulgaria's economy in 2001 showed gains as the growth of the gross domestic product (GDP) increased by about 4% compared with that of 2000; industrial production, which accounted for 28% of the GDP, grew by about 2% (U.S. Central Intelligence Agency, 2002). According to the Commission of European Communities (2002, p. 36), foreign direct investment in Bulgaria's economy as a percentage of GDP was about 5.1%, in 2001, which, in relative terms, however, was less than the 7.9% mark achieved in 2000. On balance, the continuing improvement of Bulgaria's economy moved the country farther from the many uncertainties that accompanied transition from a centrally planned economy. The new legal structure, which underpinned the country's privatization process, was an important factor in the overall growth of direct foreign investment during recent years (European Bank for Reconstruction and Development, 2001, p. 23).

The Government remained committed to transforming the economy to a market-based economic system. The Law on Transformation and Privatization of State and Municipal-Owned Enterprises, which was adopted by Parliament in 1992, and the Underground Resources Act, which was adopted in 1998, promote private enterprise and foreign investment. Although this act stipulates that underground mineral wealth is the property of the state, it provides for claims by domestic and foreign companies to be approved for the development and operation of mineral deposits for up to 35 years with additional 15-year extensions. Exploration rights to private companies can be granted for up to 3 years (Kousseff, 1999). In addition, the National Program for Sustainable Development of Mining in Bulgaria was drafted and approved in 1998. The Government continued to work to improve the country's environmental conditions.

Commodity Review

Metals

Metals have been a substantial component of the mineral industry's production. Bulgaria's mine output includes copper, iron, lead and zinc, and manganese. Additionally, byproduct gold, molybdenum, silver, and other metals have been produced, chiefly from the processing of copper and lead and zinc ores (table 1).

Copper.—In 2001, Bulgaria's copper mining and processing sector reported mixed results. Although mine production of copper rose by about 2% (copper in ore) and that of electrolytically refined copper by about 6% compared with production levels of 2000, the production of concentrates (contained metal) and smelter copper declined by 4% and 12%, respectively. The Pirdop copper smelter and refinery, which was owned by Umicore of Belgium (formerly Union Minière), accounted for about 93% of the country's total smelter copper production, of which the bulk was exported to Belgium as anode feedstock to Umicore's refinery at Olen. The facility expansion at Pirdop undertaken by Umicore would raise the production capacity for anodes to 215,000 metric tons per year (t/yr) and that for electrolytically refined copper to 45,000 t/y (Kousseff, 2002, 3 p.).

Bulgaria's major copper deposits were developed and exploited in Srednogorie-Panagjurishte region of the country at the Asarel-Medet and the Elatsite surface mines and the Chelopech underground mine. The Asarel-Medet and the Elatsite open pit operations mined a low-grade (0.2%-0.5% copper) porphyry ore, which was offset somewhat by the lesser expense of open pit mining but which also posed more serious environmental problems (Tsotsorkov, 1998) The Chelopech mining operation, which is located about 70 kilometers east of Sofia, works a polymetallic deposit that contained precious metals (mainly gold and silver) and copper. Although the Chelopech mine was primarily considered to be a gold producer owing to the much higher value of gold it produced, copper production was expected to reach about 10,000 metric tons (t) in 2001 (Metal Bulletin, 2001a).

The country's exploration and development programs for copper included mine expansion and facility modernization at Chelopech and exploration at Krumovgrad where drilling and trenching were conducted during the year (Metal Bulletin, 2001b).

Gold.—Navan Mining plc of Ireland, in addition to its operations at Chelopech, had undertaken survey and exploration work at Krumovgrad near the Greek border. Navan obtained an exploration licence in June 2000 that granted a 130-square-kilometer study area. Initial trenching in the Krumovgrad licence area found low sulfide epithermal gold hosted within sequences of Tertiary sediments and breccias. In 2001, a first-phase drilling operation was undertaken at Krumovgrad's Ada Tepe and Kuklitsa prospects. Initial drill core results reportedly found Ada Tepe more promising with gold that ranged from 5.6 to 10.1 grams per metric ton (g/t) of ore. Additional work was expected to continue in the region (Mining Journal, 2001).

Iron and Steel.—The salient event in Bulgaria's steel industry was the privatization and sale of one the country's two major steel producers, the Stomana Joint Stock Co. Sidenor S.A. of Greece acquired 75% of Stomana's assets; the balance was acquired by several private investors. To raise product range and quality, Sidenor announced a modernization program that would concentrate on modernizing the plant's rolling mills. The plant's three electric arc furnaces and slab casters will undergo subsequent modernization. In 2001, Stomana was expected to produce about 600,000 t of steel, which would comprise about 60% plate and 49% rebar [MBM (Metal Bulletin Monthly), 2001; Metal Bulletin, 2001c).

One of the provisions of pre-entry agreements between the former centrally planned economy countries of the Balkan area and Central Europe and the European Union (EU), reportedly, was required approval by the European Commission (EC) of state subsidies during the privatization of steel industry assets. Late in the year, a spokesperson for the EC indicated that the EC found the sale of the Kremikovtzi steelworks in 1999 to be not in compliance with Bulgaria's pre-entry agreement with the EU and that sale subsidies were involved despite a finding that the sale would not likely produce an economically viable enterprise. The issue of the Sidenor sale had not arisen at that time (Metal Bulletin, 2001a).

Lead and Zinc.—The lead and zinc industry in Bulgaria was based on mining and processing operations near Plovdiv, in the Ossogovo Mountains in western Bulgaria, near the Thundza River in eastern Bulgaria, and in the Madan area, near the Greek border. Lead and zinc were smelted and refined in Plovdiv and in Kurdjali in the Madan area.

Major activities during the year included the acquisition of the lead and zinc mining and beneficiation enterprise, Gorubso-Madan JSC, by the Russian-Bulgarian joint-stock company Rhrodopes Investment Gorubso JSC and the continuing efforts to reduce pollution at KCM SA, which was a major producer of lead and zinc in Bulgaria. Environmental protection work between 1995 and 2001 involved the construction of a new processing line for roasting zinc concentrates, the reconstruction of a sintering unit in the lead plant, a new waste water purification station, and a modernized pollution monitoring unit (Dobrev, 2001; Koussef, 2002).

Manganese.—Manganese mining was resumed in 2001 after a hiatus of several years. Although mine production by yearend had not reached the production levels of 1998 and earlier years, the resumption of production, however, was accompanied by United Kingdom-based investor interest in acquiring the Obrichishte Mine from its state owner Evromangan Ltd. (Koussef, 2002).

Industrial Minerals

Bulgaria produced a broad range of industrial minerals suitable for chemical and construction industry use. These included barite, calcareous rock, cement, clays, lime, salt, and silica. In 2001, the privatization process continued in the sector and included the sale offering of gypsum mining operations at Coshava (Koussef, 2002). By yearend, the cement and the dimension stone industries had achieved the highest level of privatization in the sector.

The growth of foreign investment toward the end of the 1990s resulted in substantial foreign ownership in Bulgaria's cement industry. Major investment came mainly from the EU and included the Italcementi Group, Heidelberger Zement, and Holderbank Financiere Glaris AG investing in Devnya Cement, Zlatna Panega Cement EAD, and Beloizvorski Cement, respectively. To facilitate exports to the EU, the Government adopted legislation in 2000 to establish EU standards for the construction materials and cement sector (European Bank for Reconstruction and Development, 2001, p. 23).

Mineral Fuels

Bulgaria is endowed with large, albeit low-rank, resources of coal. In 2001, the country's reserves of lignite amounted to 2.5 billion metric tons (Gt), and those of subbituminous coal, to 200 million metric tons (Mt). In 1998, the "Action Plan for Coal Mining Companies" for the period from 1998 through 2001 was published by the Government of Bulgaria. The plan called for the closure of inefficient mines to be followed by free market pricing of coal and the denationalization of the coal mining industry. The plan also called for the investment of $437 million to improve the coal mining sector; these improvements include the introduction of new technology to the industry, facility modernization, and mined-out land reclamation (U.S. Department of Energy, 1999). A substantial portion of the country's thermal electric power plants, which produce more than one-half of the country's total production of about 45 billion kilowatts, operate on domestic coal. Bulgaria also produced small quantities of crude petroleum from nine oil wells. Output in 2001amounted to about 32,000 t, which was a decline of about 22% compared with that of 2000, and virtually all Bulgaria's crude oil needs are met through imports (table 1).

Nuclear energy, which has played a significant role in Bulgaria's energy supply, accounted for about 45% of the country's electric power. The Kozloduy Nuclear Power Plant comprised six Soviet-built reactors—four VVER 440/230 units and two VVER 1000/320 units. In accordance with an agreement concluded with the European Commission in 1999, reactors 1 to 4 (VVER 440/230 units) were to be scheduled for decommissioning owing to safety concerns. In compliance with this agreement, the Government of Bulgaria undertook measures in 2001 to schedule closure of reactors 1 and 2 by 2003 and reactors 3 and 4 by 2006, following peer reviewed safety studies. Reactor units 5 and 6 will continue to operate and would be modernized with financial assistance from the EU (Commission of the European Communities, 2002, p. 83-86).

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ROMANIA

Romania's production of metals (aluminum, copper, lead and zinc, manganese, and steel and ferroalloys), industrial minerals, and mineral fuels was mainly of regional importance. In the metals sector, production results for 2001 showed recovery for primary aluminum, mined copper and primary copper metal, mine production of lead and zinc, as well as pig iron and crude (table 1).

In 2001, the country's economy appeared to improve from its decline in 2000. The GDP rose by 5.3%, and industrial production increased by 8.2% (Bank Austria Creditanstalt, 2002, p. 23). The policies of the Government of Romania were aimed at reforming the industrial sector to raise the sector's competitiveness and to prepare it for privatization.

Commodity Review

Metals

Aluminum.—Although the output of alumina fell by almost 25% in 2001, Romania's production of primary aluminum increased by about 1.6% compared with that of 2000. Given the cessation of mining bauxite in Romania in 1998, such raw materials as alumina and bauxite were imported. Full production was reported to have restarted at the Oradea alumina plant at yearend 2000 based on Australian bauxite as feedstock. The Oradea alumina plant's operation was taken over in May 2000 by JSC Russian Aluminium of Russia, which announced plans to raise production capacity at Oradea to more than 300,000 t/yr from about 250,000 t/yr by 2002 (Metal Bulletin, 2000b). Romania's other alumina plant, BBG Alum S.A. in Tulcea, was operated by the Balli Group of the United Kingdom. In 2001, this facility underwent modernization that included conversion to gas-based power and the production of sandy-grade alumina (Metal Bulletin, 2000b).

The denationalization of the country's aluminum smelting and fabricating enterprises was delayed in late 2000 and early 2001 owing to organizational considerations that involved property valuation and to concerns raised by trade unions about a potential negative impact of privatization on the workforce (Metal Bulletin, 2000a, p. 5). The sale of the Government's assets in primary aluminum producer SC ALRO SA (Slatina) and aluminum rolling mill SC ALPROM SA, in contrast with a prior decision to sell the assets of each enterprise in a separate transactions, would be sold as a joint lot to a single selected bidder. Aluminum industry concerns in France, Russia, and the United Kingdom reportedly expressed interest in a tender proffering of ALRO and ALPROM assets. At yearend, the Government of Romania controlled 54.72% of ALRO's assets and 69.92% of those of ALPROM (Metal Bulletin, 2002).

Copper.—Romania mined copper primarily in the northeastern part of the country that included mines at Baia Sprie, Cavnic, and Lesul Ursului and in the southwestern part of the country with major mines at Moldova Noua, Rosia Poieni, and Rosia Montana. Generally, the grade of ore at these mines had an average grade of about 0.35% copper or less. Concentrates from these areas have been smelted and refined at Baia Mare and Zlatna. At Baia Mare, SC Allied Deals Phoenix SA operated an Outokumpu flash smelter and also an electrolytic copper refinery and a continuous caster. At Zlatna, SC Ampelum SA operated an Outokumpu flash smelter and an electrolytic refinery (Moreno, 2000). In 2001, mine production of copper ore increased by more than 19% compared with that of 2000; total refined copper increased by more than 21% to 18, 522 t from 15,303 t in 2000.

Gold.—The development of gold deposits at Rosia Montana was allowed to move forward following approval by local officials of a relocation and resettlement plan prepared by Gabriel Resources Ltd. of Canada; this plan formed part of the environmental impact statement for the Rosia Montana project. Gabriel Resources, which owned 80% of the Rosia Montana concession, also proceeded with the completion of a feasibility study. The Government of Romania also approved the enlargement of mining concessions at Rosia Montana to provide space for infrastructure that would include plant, equipment, and a tailings dam (Mining Journal, 2001b). Gabriel resources announced plans at yearend to raise US$34.5 million to further its work at Rosia Montana. The funds would be used for engineering, permitting, and village relocation and resettlement (Northern Miner, 2001).

The Rosia Montana concession derives its name from a village of the same name near the towns of Abrud and Brad. Several underground workings in the area were found to date to Roman times. The deposits at Rosia Montana currently under consideration are the epithermal low-sulfur type in two hydrothermally altered subvolcanic intrusives that appear joined at depth; these are the Cetate, Cirnic, Cirnicel, Jig-Vaidoaia-Igre, and Orlea Tarina deposits. These deposits overall had 208 Mt of ore with an average strip ratio of 0.86 and contained about 1.56 g/t gold and 7.8 g/t silver (Gabriel Resources Ltd., 2001).

Other activities in the gold mining and exploration sector included the completion of drilling work at the Certei gold-silver property in the Apuseni Mountains by European Goldfields Ltd. (a subsidiary of Gabriel Resources). The results from 13,000 meters of drill core from 41 bore holes showed resources that amounted to more than 44 Mt of ore which contained an average of 1.9 g/t gold and inferred resources of 17 Mt which contained 1.5 g/t gold (Mining Journal, 2001a, p. 272) European Goldfields further reported the discovery of gold at Teascu, which is in the vicinity of Certej. Work at the Teascu deposit, which is within the Baita-Craciunesti property, included drilling to outline the mineralization. Early drill core results showed gold to be in the range of 1.62 to 1.79 g/t at a 0.8 g/t cutoff grade (European Goldfields Ltd., 2001).

Iron and Steel.—The privatization of Romania's steel industry was highlighted in 2001 by the acquisition of Sidex Galati SA, which was the country's largest iron and steel complex, by United Kingdom-based LNM Holdings Ltd. More than one-third of Sidex's total rated capacity of 10 million metric tons per year (Mt/yr) of steel (mainly flat-rolled products) was modernized in the late 1990s. The steel mill's modernized facilities largely accounted for its annual output of about 3 Mt. LNM Holdings planned additional facility upgrading to raise Sidex's output to 5 Mt/yr. Siderurgica Hunedoara SA and Cost SA Tirgoviste were the remaining steel mills to be privatized (Metal Bulletin, 2001c, p. 13).

SCR Resita, which had been acquired by Noble Ventures Corp. of the United States in 2000, was forced to stop production in March because of worker unrest during the transition to private ownership and the failure of several customers to meet payment obligations for thousands of metric tons of steel. Resita's management refused to accept barter-based debt payment, which was offered by a number of clients, with the exception of such commodities as natural gas and scrap that had specific value for the mill's production needs. At the same time, Resita's labor unions pressed the Government of Romania to reverse the sale of the steel mill to Noble Ventures by alleging that Noble Venture was not meeting various obligations specified in the sale contract; these included settlement of past-due wages owed the workers and a new management-labor contract (Metal Bulletin, 2001d, e). Resita's management anticipated resolving the disputed issues and also indicated that the company's open hearth furnace was taken off-line and replaced by a new 600,000-t/yr electric arc furnace. A new continuous caster also was installed (Metal Bulletin, 2001f).

Siderca SA Calarasi, which was closed in 1999 owing to financial problems, was the focus of negotiations in 2001 between the Government of Romania and AFV Beltrame SpA of Italy. Beltrame expressed interest in acquiring Siderca Calarasi, which was a producer of sections and rail with a capacity of 450,000 t/yr (Metal Bulletin, 2001a).

On balance, the iron and steel sector achieved positive results during the year because the production of pig iron and crude steel each increased by about 6% compared with 2000 production levels. The production of ferroalloys continued to decline with the exception of ferrosilicomanganese, which increased by 15.4%. Romania's scrap exports were one of the major foreign commercial issues during the year. To stop illegal scrap exports and losses of tax revenues, the Government of Romania set stringent requirements necessary to obtain export licenses. The allegedly stringent requirements with respect to physical infrastructure and equipment that traders were to meet had all but completely stopped Romanian scrap exports and led a number of traders to raise the matter with the EC as a restraint on trade (Metal Bulletin, 2001b).

Lead and Zinc.—Relatively low grade lead and zinc ore that graded from 0.4% to 1.0% lead and from 0.6% to 1.2% zinc was produced at underground mines in the Baia Mare, the Borsa, the Certej, and the Rodna districts. Moreover, Romania's lead and zinc ores also contained copper (0.35%), and associated antimony, bismuth, cadmium, gold, and silver. Because of the complex mineralogy of the lead and zinc ores, concentrates produced from them have been uneven. Metal recovery in concentrate reportedly has ranged between 50% and 75% for lead and zinc. Smelting and refining of lead and zinc from domestic and imported ores and concentrates was carried out at the Sometra S.A.'s (formerly Intreprinderea Metalurgica de Metale Neferoase) Imperial Smelter at Copsa Mica. The facility expansion undertaken by Sometra in 2000 and 2001 included the installation of new furnaces and condensers and the overall upgrading of the lead and zinc refinery (Metal Bulletin, 2000c). In 2001, mine production of lead increased by about 4.9% compared with that of 2000; mine production of zinc increased by about 9%. The production of refined lead decreased by about 3.7% compared with that of 2000. The production of refined zinc in 2001 declined by about 8%; it was, however, an increase of about 56% compared with that of 1997, which reflected the recent modernization program (table 3).

Industrial Minerals

Romania produced a broad range of industrial minerals that included barite, various calcareous rocks, granitic-pegmatitic sources of feldspar and mica, clays, gypsum, graphite, silica group minerals, and salt. In 2001, seven privately owned companies and one state-owned company were involved in the mining and quarrying of industrial minerals. The modernization of the country's economy and infrastructure was expected to increase the domestic demand for industrial minerals and construction materials (Harris, 2001).

Mineral Fuels

The petroleum extraction, production, and refining industry historically has been among Romania's leading industrial sectors. Although small by world standards, the petroleum industry continued to be an important component of the country's energy balance. Estimates of petroleum resources have ranged from 1.0 to 1.6 Gt. The extraction of crude petroleum in recent years, however, has exhibited a declining trend. From 1997 through 2001, inclusively, petroleum output declined each year by about 2%, 3%, 2%, 2%, and 1% respectively, compared with the preceding year (table 1). Although the slight decrease in 2001 continued the declining trend of output, industry spokespersons anticipated a small increase in petroleum production in the near future owing to increasing exploration trend by foreign oil companies (Lynch,1999). Following the successful testing of the Pescarus 62 offshore delineation well, exploration contracts were offered to foreign investors (Oil & Gas Journal, 2001). The country's refined petroleum products capacity amounted to about 25 Mt/yr (table 4).

Coal was produced at 34 mines from resources that amounted to 3.5 Gt, of which 75% was lignite, 22% was bituminous coal, and 3% was brown coal. Coal accounted for about 60% of the primary fuel for the country's principal electric power stations (Lynch, 1999). The total output of marketable coal in 2001 increased by almost 14% compared with that of 2000. The production of metallurgical coke, however, declined by about 9%. In 2001, steel producer Sidex SA initiated an upgrading of its coke batteries by the planned installation of a coke oven gas desulfurization plant to remove ammonia and hydrogen sulfide. A contract was awarded to Rautaruuki Oyj of Finland to install the plant with assistance from Romanian engineering firms by the middle of 2002 (Steel Times, 2001).

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TABLE 1
BULGARIA: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity		1997	1998	1999	2000	2001 e/
METALS						
Aluminum, metal, secondary		3,127	6,685 r/	4,192	8,430 r/	8,000
Bismuth, metal e/		40	40	40	40	
Cadmium, metal, smelter		280	195 r/	217	233 r/	233 3/
Copper:						
Ore:						
Gross weight	thousand tons	21,836	21,207 r/	22,346 r/	22,829 r/	24,878 3/
Cu content e/	do.	109	105	113	113	115
Concentrate:						
Gross weight	do.	463	438	482	462	438 3/
Cu content	do.	93	88	96	92	88
Metal, primary and secondary:						
Smelter		114,630	119,500	107,000 r/	178,000 r/	157,000 3/
Refined, electrolytically		34,530	36,400	21,000 r/	32,400 r/	34,400 3/
Gold, metal	kilograms	1,020	1,253	2,743	2,347 r/	2,540 3/
Iron and steel:						
Iron ore:						
Gross weight	thousand tons	858	895	699	559 r/	325 3/
Fe content	do.	242	250 e/	223	178	92
Iron concentrates	do.	479	463	361	304	240 3/
Metal:						
Pig iron for steelmaking	do.	1,610	1,400	1,100	1,200	1,000
Ferroalloys, ferrosilicon e/	do.	10	10	10	10	10
Steel, crude	do.	2,628	2,240	1,890	2,023 r/	1,942 3/
Semimanufactures, rolled	do.	2,242	1,942 r/	1,535 r/	1,455 r/	1,500
Lead:						
Mine output, Pb content		32,000	22,000	14,000	14,000	17,000
Concentrate:						
Gross weight		39,800	34,595	25,208	15,019	26,400 3/
Pb content e/		27,900	24,200	17,000	10,500	18,500 3/
Metal, refined, primary and secondary		73,000 r/	77,100	81,600	84,100	88,300 3/
Manganese ore:						
Gross weight		47,430	55,600	--	--	1,516 3/
Mn content e/		14,000	17,000	--	--	450
Silver, mine output, Ag content		32	68	59	55 r/	57 r/
Tin, metal		8	10 e/	10 e/	10	10
Uranium, oxide, U content e/		600	600	600	600	600
Zinc:						
Mine output, Zn content e/		21,000	18,000	12,000	10,000	10,600 3/
Concentrate:						
Gross weight		38,420	33,600	19,560	18,096	23,301 3/
Zn content e/		20,000	17,000	10,200	9,400	12,100
Metal, smelter, primary and secondary		82,000	86,100	83,700	84,200	88,600 3/
INDUSTRIAL MINERALS						
Asbestos fiber, all grades		300	300 e/	300 e/	300	300
Barite ore, run of mine		285,000	452,197	1,124,000	875,000 r/	825,000 3/
Cement, hydraulic	thousand tons	1,656	1,742 r/	2,060 r/	2,209 r/	2,200
Clays:						
Bentonite	do.	171	176	232	296	308 3/
Kaolin, washed	do.	150	150 e/	140 e/	150	150
Refractory	do.	62	56	48	34	37 3/
Feldspar	do.	36	36	28	22	23 3/
Fluorspar e/	do.	2	2	2	2	2
Gypsum and anhydrite:						
Crude	do.	156	184	149	170	167 3/
Calcined	do.	60	75 r/ e/	55 e/	65	50
Lime, industrial	do.	849	1,000 e/	1,068	1,388	2,025 3/
Limestone and dolomite	do.	10,842	11,000 e/	11,000 e/	11,000	11,000
Nitrogren, N content of ammonia	do.	982 r/	527 r/	378 r/	647 r/	600
Perlite	do.	20	12	13	17	12 3/
Pyrites, gross weight e/	do.	150	150	150	150	15
Salt, all types	do.	1,600	2,400	1,300	1,700	1,931 3/

See footnotes at the end of the table.

TABLE 1--Continued

BULGARIA: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity		1997	1998	1999	2000	2001 e/
INDUSTRIAL MINERALS--Continued						
Sand and gravel	thousand cubic meters	2,140	2,000 e/	2,000 e/	2,200	2,000
Silica (quartz sand)	thousand tons	557	593	533	690	677 3/
Sodium carbonate, calcined	do.	800	800	800	800	800
Sulfur: e/						
Sulfur content of pyrite		50,000	50,000	50,000	50,000	50,000
Byproduct		50,000	50,000	50,000	50,000	50,000
Total		100,000	100,000	100,000	100,000	100,000
Sulfuric acid		550,700	500,000 e/	500,000 e/	500,000	500,000
MINERAL FUELS AND RELATED MATERIALS						
Coal, marketable:						
Anthracite	thousand tons	16	16	17	18	14 3/
Bituminous	do.	130	105	106	100	101 3/
Brown	do.	3,491	3,692	3,074	3,211	3,151 3/
Lignite	do.	26,929	27,435	22,696 r/	23,765	23,856 3/
Total	do.	30,566	31,248	25,893	27,094	27,122
Coke	do.	1,239	1,200 e/	1,200 e/	1,200	1,200
Natural gas, marketed	million cubic meters	38	33	27	15	22 3/
Petroleum:						
Crude, reported	thousand tons	28	32	39	41	32 3/
Refinery products e/	thousand 42-gallon barrels	25,000	25,000	25,000	25,000	25,000

e/ Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. r/ Revised.

1/ Table includes data available through October 2002.

2/ In addition to commodities listed, chromite, magnesite, palladium, platinum, tellurium, and uranium and a variety of crude construction materials (common clays, dimension stone, and crushed stone) are produced, but available information is inadequate to make reliable estimates of output level.

3/ Reported figure.

TABLE 2
BULGARIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity
Cement	"Devnia-Cement" EAD	Devnia	2,000.
Do.	Zlatna Panega	Panega	1,000.
Do.	Others	Temelkovo, Dimitrovgrad, Pleven, and Beli Izvor	1,590.
Coal:			
Bitiminous	Economic Mining and Power Combine (SMEK) Balkanbass	Balkan coal basin, northwest of Silven, central Bulgaria	445.
Brown	G. Dimitrov	Pernik coal basin, southwest of Sofia	4,000.
Do.	Others	Bobov Dol and Pirin, western Bulgaria	3,100.
Lignite	SMEK East Maritsa	East Maritsa coal basin near Zagora	25,000.
Do.	Others	Marbas. Pernik, and Bobov Dol coal basins	5,300.
Copper (Cu):			
Concentrate, Cu content	Asarel-Medet AD.	Panagurishte, Pazardzhik District	25.
Do.	Chelopech Ltd.	Srednogorie, Sofia District	5.
Do.	Bradtze	Malko Turnovo	2.
Do.	Elatzite-Med Ltd.	Srednogorie, Sofia District	15.
Do.	Rosen	Burgas, near the Black Sea	1.
Do.	Tsar Asen	Srednogorie, Sofia District	2.
Do.	Burgaskii Mines Ltd., Zidorovo	Burgas, near the Black Sea	0.5
Metal, refined	Umicore Pirdop Copper Smelter & Refinery	Srednogorie, Sofia District	120.
Iron ore	Kremikovtsi Iron and Steel Combine	Kremikovtsi	2,000.
Lead-zinc (Pb-Zn):			
Concentrate, Pb-Zn content	Gorubso Co.	Erma Reka, Kurdjali, Laki, and Rudozem, all in Madan area near Greek border	59 Pb, 47 Zn.
Do.	Madzharovo Ltd.	Near Plovdiv	3 Pb, 2 Zn.
Do.	Ossogovo Ltd.	Ossogovo Mountains, western Bulgaria	3 Pb, 2 Zn.
Do.	Ustrem Ltd.	Near Thundza River, eastern Bulgaria	3.5 Pb, 0.8 Zn.
Metal:			
Pb, refined	KCM SA (formerly Dimitur Blagoev)	Plovdiv	44.
Do.	Lead and Zinc Complex Ltd.	Kurdjali	60.
Zn, smelter	KCM SA (formerly Dimitur Blagoev)	Plovdiv	60.
Do.	Lead and Zinc Complex, Ltd.	Kurdjali	30.
Manganese ore	Mangan Ltd. (Obrotchishte)	Varna District	50.
Natural gas	Ministry of Power Supply	Chiren field, northwestern Bulgaria	(1/).
Petroleum:			
Crude	do.	do.	(1/).
Refined barrels per day	Economic Trust for Petroleum Products	Refineries in Burgas, Pleven, and Ruse	134,000.
Steel, crude:	Kremikovtsi Iron and Steel Works	Near Sofia	2,300.
Do.	Stomana Iron and Steel Works	Pernik	800.

1/ Insignificant capacity.

TABLE 3
ROMANIA: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity		1997	1998	1999	2000	2001
METALS						
Aluminum:						
Bauxite, gross weight		127,450	161,865	--	--	--
Alumina, calcined, gross weight		281,636	250,226	277,388	416,587	319,403
Ingot including alloys:						
Primary		162,987	174,038	174,452	179,038	181,831
Secondary		2,042	1,110	146	2,305	682 r/
Total		165,029	175,148	174,594	181,343	182,513
Bismuth, mine output, Bi content e/		40	40	40	40	40
Cadmium metal, smelter		5	--	--	--	--
Copper:						
Mine output, Cu content of concentrate		23,190	19,065	16,807	16,099	19,185
Metal:						
Smelter:						
Primary		25,024	18,708	24,010	16,429	8,979 r/
Secondary e/		1,000	1,000	2,000	2,000	2,000
Total		26,024	19,708	24,010	18,429	10,979
Refined:						
Primary		22,912 r/	21,008	20,294	15,303	18,522
Secondary e/		4,000	2,000	4,000	4,000	4,000
Total		26,912 r/	23,028	24,294	19,303	22,522
Gold, mine output, Au content e/	kilograms	3,500	3,500	3,500	3,500	3,500
Iron and steel:						
Iron ore:						
Gross weight	thousand tons	756 r/	459	131	116	292 r/
Metal content	do.	147 r/	85	71	55	76 r
Metal:						
Pig iron	do.	4,557	4,541	3,006	3,066	3,243 r/
Ferroalloys:						
Ferrochromium		950	873	--	--	--
Ferrosilicon		9,620	5,553	5,000	8,309	5,823
Ferromanganese		11,505	4,170	25	1,989	384
Ferrosilicomanganese		62,570	83,617	550	62,320	71,921
Silicon metal e/		300	150	--	200	200
Steel, crude	thousand tons	6,674	6,336	4,355	4,672	4,936 r/
Semimanufactures:						
Pipes and tubes	do.	633	661	348	465	665 r/
Rolled products	do.	4,804	4,391	3,377	3,687	3,582 r/
Lead:						
Mine output, Pb content of concentrate		19,447 r/	15,144	20,484	18,750	19,676
Smelter, primary e/		10,000	10,000	15,000	15,000	15,000
Refined: e/						
Primary		13,000 r/	15,000	13,000	25,000	24,000
Secondary		4,000	3,000	3,000	3,000	3,000
Total		17,000	18,000	16,000	28,000	27,000
Manganese:						
Ore, gross weight	thousand tons	100 e/	100	60	24	70
Concentrate: 3/						
Gross weight	do.	68	73	42	19	55
Mn content	do.	17	19	11	5	14
Silver, mine output, Ag content		60 e/	60	18	18	18 e/
Zinc:						
Mine output, Zn content of concentrate		31,737 r/	25,650	26,536	27,452	29,786
Metal, smelter, primary and secondary		30,226 r/	29,427	29,000	51,900	47,200
INDUSTRIAL MINERALS						
Barite, processed		12,729	10,327	4,641	4,266	2,851 r/
Cement, hydraulic	thousand tons	6,553 r/	6,577	5,580	6,058	5,668
Clays:						
Bentonite:						
Run of mine e/		60,000	60,000	45,000	75,000	60,000
Marketable		27,133	25,434	19,609	37,687	24,779 r/

See footnotes at end of table.

TABLE 3--Continued
ROMANIA: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity		1997	1998	1999	2000	2001
INDUSTRIAL MINERALS--Continued						
Clays--Continued:						
Kaolin:						
Run of mine e/		90,000	75,000	73,000	70,000	70,000
Marketable		29,169	24,742	23,586	18,942	21,867 r/
Diatomite		23,880	34,600	11,592	8,890	9,743 r/
Feldspar		25,962	37,010	36,635	37,157	43,037 r/
Fluorspar e/		15,000	15,000	15,000	15,000	15,000
Graphite		2,563	1,951	1,041	1,251	1,176
Gypsum	thousand tons	79	297	305	218	275 r/
Lime	do.	1,599	1,813	1,464	1,666	1,790 r/
Nitrogen, N content of ammonia	do.	783 r/	385	687	1,033	1,000
Pyrites, gross weight	do.	208 r/	200	68	70 e/	70 e/
Salt:						
Rock salt	do.	254	68	100	52	49 r/
Other	do.	2,369	2,220	2,199	2,256	2,176
Total	do.	2,623	2,288	2,299	2,308	2,224
Sand and gravel	do.	711	1,049	748	814	733
Sodium compounds, n.e.s.:						
Caustic soda	do.	322	310	289	343	346
Soda ash, manufactured, 100% Na_2CO_2 basis	do.	548	482	431	391	448 r/
Sulfur:						
S content of pyrites	do.	52	50	17	10	2
Byproduct, all sources e/	do.	200	200	200	200	200
Total e/	do.	252	250	217	210	202
Sulfuric acid	do.	330	229	234	181	58
Talc		7,578	8,134	8,289	7,850	7,270 r/
MINERAL FUELS AND RELATED MATERIALS						
Carbon black		21,400	18,450	12,490	14,756	15,538
Coal, washed:						
Anthracite and bituminous	thousand tons	4,267	3,201	2,751	3,251	14 r/
Of which:						
For coke and semicoke production	do.	324	192	110	13	14
For other uses	do.	10	2	1	--	--
Brown	do.	692	--	--	291	324 r/
Lignite	do.	32,281	26,037	22,472	25,752	32,457 r/
Total	do.	37,240	29,238	25,223	29,294	32,795
Coke:						
Metallurgical	do.	3,110	2,929	1,593	1,534	1,343 r/
Other	do.	1	--	--	79	70
Total	do.	3,111	2,929	1,593	1,613	1,413
Gas, natural, gross:						
Associated	million cubic meters	1,245	1,210	1,164	1,249	1,424 r/
Nonassociated	do.	14,671	13,231	13,413	13,358	12,666 r/
Total	do.	15,916 r/	14,441	14,577	14,607	14,090
Petroleum:						
Crude:						
As reported	thousand tons	6,515	6,309	6,154	6,042	6,011 r/
Converted	thousand 42-gallon barrels	48,760	47,020	45,866	45,300	45,100
Refinery products e/	do.	125,000	95,000	77,265	75,000	75,000

e/ Estimated. r/ Revised.

1/ Includes data available through October 2002.

2/ In addition to the commodities listed, antimony, asbestos, and a variety of crude construction materials are produced, and molybdenum may have been produced as a byproduct of copper from 1988 on, but output is not reported quantitatively, and available information is inadequate to make relaible estimates.

3/ Estimated series were based on published data on concentrate production.

TABLE 4
ROMANIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies (Government-owned unless otherwise specified)	Location of main facilities	Annual capacity
Alumina	Semtrade Oradea Alimina plant	Plant at Oradea, near Hungarian border	262.
Do.	BBG Alum SA (Balli Group of the United Kingdom and Bayrakter Co. of Turkey)	Plant at Tulcea, Danube Delta	400.
Aluminum, primary	Alro SA (Slatina Aluminium Enterprise)	120 kilometers west of Bucharest	170.
Barite	Ministry of Industry	Ortra mine, Rosia Montana, southwest of Cluj	100.
Bauxite	do.	Oradea-Dobresti Mining Complex, near Hungarian border	350.
Cement	Cimentul SA Turda	Plant at Turda, 600 kilometers from port of Constanta	Cement, 765; clinker, 280.
Do.	Casial SA Deva	Deva, Hundoara county.	Cement, 1,200; clinker, 1,200.
Do.	SC Cimentul Cimus SA	Plant at Cimpulung, about 499 kilometers from port of Constanta	Cement, 2,112; clinker, 744.
Do.	Moldocim SA Bicaz	Plant at Bicaz, about 450 kilometers from port of Constanta	Cement, 1,900; clinker, 1,520.
Do.	SC Tagrimpex Romcif SA Fieni	Plant at Fieni, about 420 kilometers from port of Constanta	Cement, 950; clinker, 900.
Do.	SC Alcim SA	Plant at Alesd, 812 kilometers from port of Constanta	Cement, 3,674; clinker, 2,427.
Do.	Lafarge Romcim	Plant at Hoghiz, 437 kilometers from port of Constanta	Cement, 1,128; clinker, 970.
Do.	do.	Medgidia plant, about 35 kilometers west of Constanta	Cement, 2,500; clinker, 1,910
Do.	do.	Plant at Jiu, about 533 kilometers from the port of Constanta	Cement, 729; clinker, 530.
Coal:			
Bituminous	Compania Nationala a Huilei-Petrosani	Valea Jiului Mining Complex, near Hunedoara	10,400.
Lignite	Societatea National a Lignitului Oltenia-Targu Jiu	Jiu Valley, Oltenia County, north of Craiova	20,300.
Do.	Societatea National a Carbunelui-Ploiesti	About 50 kilometers north of Bucharest	8,700.
Copper:			
Ore (concentrate)	Compania Nationala REMIN S.A. and Compania Nationala Minvest S.A.	Baia Mare, Baia-Sprie, and Cavnic mines, northwestern area near the Ukrainian border; Rosia Montana, Noud, Borsa Balan, and Lesul-Ursului Mines, in east-west arc along Carpathian range; Rosia Poieni Mine; and Moldova Noua Mine, southwest near Danubian border with Yugoslavia	180.
Metal	Compania Nationala REMIN S.A.	Outokumpu flash smelter and electrolytic refinery at Baia Mare in the northwestern area, near the Ukrainian border	35.
Do.	do.	Zlatna smelter and refinery, Apuseni, northwestern Romania	13.
Ferroalloys	Ferom-Joint Stock Co.	Complex at Tulcea	280.
Iron ore	Compania Nationala Minvest	Mining complex at Hunedoara, in west-central Romania	1,320.
Do.	do.	Resita Mining Complex, southwestern Romania, near Yugoslav border	660.
Do.	do.	Napoca-Cluj Mining Complex, on the Somesul River, northwestern Romania	990.
Lead:			
Ore (concentrate)	Compania Nationala REMIN S.A.	Baia Mare Mine, near Ukrainian and Hungarian borders	24.
Do.	Compania Nationala Minvest	Balan Mine, 50 kilometers southwest of Piatra Neamt	10.
Metal	Sometra S.A.	Imperial Smelter at Copsa Mica on the Timava Mare River, central Romania	42.
Natural gas million cubic feet per year	Ministry of Industry, Department of Energy	Tirgu Mures Field at Tirgu Mures, north-central Romania	996,000.
Do. do.	do.	Ploesti Field, 50 kilometers north of Bucharest	249,000.

TABLE 4--Continued
ROMANIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies (Government-owned unless otherwise specified)	Location of main facilities	Annual capacity
Petroleum:			
Crude: 42-gallon barrels per day	Ministry of Industry, Department of Energy (SNP Petrom SA)	Ploesti-Teleajen, Pitesti, and Tirgoviste Fields, in Prahova Valley around Bucharest; Bacau Field at Bacau near the Siretul River, east-central Romania; and West Carpathian Field between the west bank of the Olt River and Tirgu Jiu, southeastern Carpathian Mountains	250,000.
Refined: do.	Ministry of Industry, Department of Energy	Refineries at Brazil, Pitesti, Onesti, Barcau, Borzesti, Brasov, Cimpina, Darmanesti, Oradea, Ploesti, Teleajen, and Navodari	664,000.
Steel	Gavazzi Steel SA (formerly Otel Rosu)	Caras-Severin, southeastern region, near Yugoslav border	400.
Do.	SC Industrie Sarmei SA	Campia Turzii, Cluj, northwestern Romania	300.
Do.	Sidex S A Galati	Danube River, north of Brail, near Ukrainian border	10,000.
Do.	SC Siderurgica SA Hunedoara	West-central Romania, near Calan	2,135.
Do.	CSR SA Resita	Southwestern Romania, about 20 kilometers southwest of Caransebes	1,200.
Do.	Siderica SA Calarasi	Near the Bulgarian border close to the Danube River	2,200.
Do.	COST SA Targoviste	Tirgoviste, Dimbovita, near Bucharest	1,100.
Zinc:			
Ore (concentrate)	Compania Nationala Minvest SA	Baia Mare, near Ukrainian and Hungarian borders	60.
Metal	Sometra S.A.(Mytilineos Holdings, 88%)	Imperial Smelter at Copsa Mica, Tirnava River, central Romania	66.

THE MINERAL INDUSTRIES OF

THE COMMONWEALTH OF INDEPENDENT STATES

ARMENIA, AZERBAIJAN, BELARUS, GEORGIA, KAZAKHSTAN, KYRGYZSTAN, MOLDOVA, RUSSIA, TAJIKISTAN, TURKMENISTAN, UKRAINE, AND UZBEKISTAN

By Richard M. Levine and Glenn J. Wallace

The Commonwealth of Independent States (CIS) was created in December 1991 by republics of the former Soviet Union (FSU). In the adopted declaration, the participants of the CIS declared that their interaction was to be based on the principle of the sovereign equality of all the members and that the member states were independent and equal subjects of international law. The CIS is not a state and does not have supranational powers (Executive Committee of the Commonwealth of Independent States, 2001§[1]). In 2001, the members of the CIS were Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan.

In September 1993, the CIS signed an agreement for the creation of an economic union "to form common economic space grounded on free movement of goods, services, labor force, capital; to elaborate coordinated monetary, tax, price, customs, external economic policy; to bring together methods of regulating economic activity and create favorable conditions for the development of direct production relation" (Interstate Statistical Committee of the Commonwealth of Independent States, undated§).

The southern tier of states of the CIS comprises the three Caucasus countries of Armenia, Azerbaijan, and Georgia and the five Central Asian countries of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan. These countries on the border of the Islamic world through which the traders of the "Silk Route" once passed are now important for their geopolitical significance and for their economic significance as potential world suppliers of oil and other minerals. Because of the lack of more-intensive coverage of these countries' nonfuel mineral industries (except for those of Kazakhstan) in recent years, this report on the CIS countries will focus more on the nonfuel mineral industries of these Silk Route countries. Refer to the report on the CIS countries for 2000 for more-extensive coverage of the mineral fuel industries of the CIS countries and to the annual reports on these countries' fuel industries from the U.S. Department of Energy's U.S. Energy Information Administration.

Armenia

Armenia is a mountainous country. More than 70% of its territory is at elevations of more than 1,500 meters (m) above sea level, and 40%, at elevations of more than 2,000 m. By the end of the Soviet era, Armenia had been mining one-third of the Soviet Union's output of molybdenum. It also mined copper, copper-zinc, and native gold deposits. Significant byproduct constituents in the country's nonferrous ores included barite, gold, lead, rhenium, selenium, silver, tellurium, and zinc.

Armenia had a large industrial minerals industry and at the end of the Soviet era was the largest producer of perlite in the Soviet Union. It produced a number of other industrial minerals, which included clays, diatomite, dimension stone, limestone, salt, and semiprecious stones, and had a diamond cutting industry. Armenia, however, had practically no mineral fuel production.

The country has identified 18 metals deposits with copper, gold, iron, lead, molybdenum, silver, and zinc; of these, 12 deposits of nonferrous and precious metals were either being worked or under development. The largest mining enterprise was the Zangezur copper-molybdenum mining and beneficiation complex (Agabalyan, 2001).

Deposits were being developed by using open pit or underground or both of these methods. All underground mining in Armenia is in mountainous terrain. Open pit mining was conducted at the Agarak and Zangezur copper-molybdenum complexes and will be used to develop the Mgartskoye gold field, which recently confirmed reserves of 2 metric tons (t) each of gold and silver. Investment in developing Mgartskoye reportedly was to be recouped in 1 year. Many gold deposits in the area are similar to Mgartskoye. Development of the Sotkskoye gold field was by underground and open pit methods. Underground methods either were being used or will be used to develop the Alaverdi, Kapan, and Shamlug copper deposits, the Akhtal polymetallic deposit, the Megradzor gold deposit, and the Lichkvazkoye, Terterasarskoye, and Shaumyanskiy Rayon gold-polymetallic deposits. On occasion, as in the case of the Kapan deposit, some open pit mining was also being done. The Kapan copper deposit and the Shamlug gold-polymetallic deposit were being developed by one mining enterprise, which reduced the expenses because of the sharing of facilities that include the beneficiation plant. The Ararat gold extraction plant was planning to restart its open pit gold mining operations (Agabalyan, 2001).

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[1] References that include a section twist (§) are found in the Internet References Cited section.

Armenia was interested in developing the Razdanskiy Rayon iron ore deposit, which is located on the slopes of the Sulagyan Mountains. The ore was reportedly of very good quality and suitable for the production of pure iron, special steels, and precision alloys, which were said to be of the highest quality (Agabalyan, 2001).

The diamond-cutting industry was expanding and accounted for a significant share of the country's export earnings. Armenia had four state diamond-cutting plants and a number of private diamond-cutting enterprises (Interfax Mining and Metals Report, 2000a; U.S. Embassy, Yerevan, Armenia, 2000§). Cut diamond and jewelry made up 35% of Armenia's exports (Interfax Central Asia and Caucasus Business Report, 2002a§).

The country's first diamond-cutting plant Shoghakn (Sapphire) was established during the Soviet period in 1973 in Nor Hajyn near Yerevan. Russia's exports of uncut diamond to Armenia ceased in 1995 but resumed in 1999 on the basis of an intergovernmental agreement for the delivery of Russian raw diamond to Armenia between 1999 and 2001 whereby the Russian mining company Almazy Rossii Sakha (ALROSA) agreed to supply Armenia with 30,000 carats per year of Russian diamond (Foreign Broadcast Information Service, 1998§).

Armenia's diamond-cutting industry established other sources of supply. In 1992, the Arslanian cutting works in Belgium established the Lorii diamond-cutting enterprise. In 1999, Lorii employed about 400 diamond cutters. It worked under an agreement in which the Belgian company supplied uncut diamond to Lorii, and Lorii then returned the cut diamond to Arslanian for sale. Arslanian also supplied uncut diamonds to the privately owned Aghavni and Andranik diamond-cutting plants that were established near the Lorii plant in the 1990s, to the state-controlled Lusampor plant in Aragtsotn Province, and to the private Amma plant in the town of Artashat in Ararat Province. The Belgian firm Tashe also was a supplier of diamond to Armenian cutting enterprises and, together with Arslanian, established the diamond-cutting company Arevakan L.L.C.

Diamond Company of Armenia (DCA) in Yerevan started operations in May 1999. DCA's main supplier and distributor was De Amdel N.V. from Belgium, which was affiliated with De Beers. DCA was owned by the British company Furfano, Ltd., which was registered in the Shannon offshore zone in Ireland (Interfax Mining and Metals Report, 2000b). The largest state diamond-cutting enterprise was Shoghakn.

Dicalite Europe NV, part of the U.S. firm Grefeo Minerals Inc., purchased the state enterprise Aragats Perlite for $1.42 million in June 1998. Dicalite obtained the rights to mine the Aragats-Perlite deposit for 22 years and to extract 1.11 million metric tons per year (Mt/yr) (600,000 cubic meters) of raw material. The Aragats deposit's reserves were reportedly about 160 million metric tons (Mt), which was more than one-half of Armenia's total perlite reserves (Khachataryn, 1999§). Dicalite exported raw material from this deposit to its own perlite processing enterprises in Europe. Prior to the beginning of the 1990s, the company traditionally purchased perlite from Armenia. Products obtained from its perlite processing were sold on Western European markets and to the recently growing Russian market. For the lease period (22 years), Dicalite had the right to export all of its production or about 24 Mt of raw material (15% of the reserves of the Aragats deposit) from the country on the basis of an agreement signed with the Ministry of Environmental Protection (Khachataryn, 1999§).

Azerbaijan

Azerbaijan occupies 86,600 square kilometers (km^2) and has lowland, piedmont, and mountainous terrains. Owing to its location on the Caspian Sea, it possesses large oil and gas reserves in offshore and onshore regions of the Caspian. Azerbaijan's most significant reserves in terms of value were its oil reserves, which are located offshore in the Caspian Sea. A large number of major foreign firms were involved in projects to develop these reserves. The mountainous regions contain a variety of nonfuel mineral deposits.

On the slope of the Caucasus Mountains, the Dashkasan iron ore deposit served as the base for the construction of the Azerbaijan mining and beneficiation complex, which was the largest iron ore mining enterprise in the Transcaucasus, and had produced more than 1.4 Mt/yr of high-grade iron ore concentrate. Almost all the concentrate had been sent to the Rustavi steel mill in neighboring Georgia. Cobalt also was mined from the Dashkasan deposit. Not far from Dashkasan, the Zaglik alunite deposit, which was the largest in the CIS, was developed. The alunite was used for alumina production at a refinery in Gyandzha 46 kilometers (km) from the mine; the refinery also produced sulfuric acid and potassium sulfate, which is a nonchloride potash fertilizer. The alumina supplied the domestic Sumqayit aluminum smelter (Mamedov and Khalil-zade, 2001).

In the mountainous region, the Kedabeksiy Rayon deposit produced copper and byproduct gold and silver for more than a century. Because of the technology that was used in the past, only ore with more than 2.5% copper was mined; the rest was left in the ground or in waste and tailings piles. In 1991, a new assessment of the Kedabeksiy Rayon deposit determined that 4 Mt of ore with a copper content of less than 2.5% remained and that the waste piles from processing contained material with a copper content of 0.45%, a gold content of 2.3 grams per metric ton (g/t), and a silver content of 27.3 g/t. The country found these wastes and secondary quartzite from the Kedabeksiy Rayon deposit to be of interest for secondary processing of copper, gold, and silver; the secondary quartzite was suitable for heap leaching to extract gold.

In prior years, arsenic had been mined in the Dzhul'finskiy region, barite in the Khanlarskiy region, molybdenum in the Ordubadskiy region, lead and zinc polymetallic ore in the Norashenskiy and Ordubadskiy regions, and iron pyrites in the Khanlarskiy region. The mountainous region also contained a number of large enterprises that produce, for example, facing materials from the Buzgovskiy and Shakhtakhtinskiy deposits, travertine from the Nakhichevan District, and marble from Dashkasan (Mamedov and Khalil-zade, 2001).

Large layers of bentonite clays are in the Dash-Salakhlinskoye deposit in the Kazakhskiy region, on the base of which an open pit with the capacity to extract more than 1 Mt/yr was developed in the 1970s. All the bentonite from the deposit was used in the Soviet Union for the production of iron ore pellets, but in 2001, the enterprise was practically at a standstill for lack of orders (Mamedov and Khalil-zade, 2001).

Along with deposits that had been developed, a number of undeveloped deposits for minerals, such as copper, gold, lead, silver, and zinc, have been explored in the mountainous section of the country. Reserves have been established at some of these undeveloped deposits, and preparations were being made for development. The largest of these in terms of reserves was the pyrite polymetallic Filizchayskiy deposit, which also was the largest such deposit in the European part of the FSU. The Katekhskoye, Katsdagskoye, and Khikhinskoye deposits in the Sheki-belokanskiy zone on the southern slope of the Caucasus contain large amounts of copper, iron, lead, sulfur, and zinc. Owing to the complexity of these ores, however, new technologies will have to be developed to process them economically. Other copper deposits have been discovered in other areas of the Caucasus region of Azerbaijan, such as the Karadagskiy porphyry-copper deposit in the Shamkhorskiy region; this deposit has been studied for production by means of bioleaching, and a complex has been designed that would produce 30,000 metric tons per year (t/yr) of copper (Mamedov and Khalil-zade, 2001).

The mountainous regions of Azerbaijan have a number of gold deposits. Azerbaijan has contracted with RV Investment Group Services of the United States under a production-sharing agreement to develop nine gold deposits. In the coming decade, plans call for the country to have a gold mining and metal production industry (Mamedov and Khalil-zade, 2001). In the Nakhichevan region, large dolomite resources with seams of between 5,500 and 6,000 m and larger crop out on the surface of ground that is not suitable for agriculture and not far from transport links (Mamedov and Khalil-zade, 2001).

If further developed with proper ecological safeguards, the nonfuel mineral resources of Azerbaijan could resolve a number of social problems that have arisen from a lack of jobs in the countryside, which was driving people to abandon villages and thus transferring the problems of unemployment to the larger cities and their environs (Mamedov and Khalil-zade, 2001).

Belarus and Moldova

Belarus and Moldova each had one of the two steel minimills built in the FSU. Neither country possessed significant mineral resources except for potash in Belarus. Belarus also had a large oil refining industry that was mainly controlled by Russian companies.

Georgia

Although mining in Georgia dates back thousands of years, rapid development of the country's mineral resources occurred in the period between 1930 and 1980 when mining commenced at more than 200 deposits for a variety of minerals, such as arsenic, barite, bentonite, coal, diatomite, gold, and zeolites, and a range of nonferrous metals. Manufacturing enterprises, metallurgical plants, and other processing facilities that used these mineral products were constructed. A large portion of the mineral products, which included arsenic, barite, copper and gold concentrates, facing stone, gold-bearing ores, ferroalloys, lead concentrates, manganese concentrates, zeolites, and zinc concentrates, was exported (Dzhanelidze, Kuteliya, and Chokhonelidze, 2001).

Following the dissolution of the Soviet Union in 1991, the mineral industry experienced a severe decline. The Chiat'ura manganese deposit and the Madneuli barite-polymetallic ore deposit, however, played an important role in the revival of the country's mineral industry. Before the Soviet revolution and during the Soviet period, Chiatura was a major supplier of high-grade manganese ore, but production had been declining even during the Soviet period. Following the dissolution of the Soviet Union, manganese output dropped sharply.

The Chiaturmarganets manganese mining company, which mined the Chiat'ura deposit, hoped to sign a deal to supply 200,000 t/yr of ore to Delta Export Ltd. of the United States. The Georgian company had found it hard to sell its products in recent years. Recent sales to Czech and Russian investors, who worked closely with Chiaturmarganets in 1998-99, had been erratic, and the enterprise had not been able to win new markets. In 2001, it produced 11,000 t of manganese concentrate. Chiaturmarganets was incorporated in 1993. Charter capital was $110 million. The state owned 79.9% of the shares. The Chiat'ura-Sachkhera manganese field, which the company developed, was estimated to contain more than 200 Mt of ore (Interfax Mining and Metals Report, 2001a).

Georgia had a list of explored reserves awaiting development. Georgian analysts from the mineral sector believe that developing the country's nonferrous, precious, and rare-metals reserves that are located in the mountainous regions of the country should be the sector's top priority.

For a 50-year period, the Madneuli barite-polymetallic deposit, which was the country's largest mining enterprise; the Kvaisinskiy barite-zinc deposit; and the Lukhumskoye and Tsanskoye arsenic deposits have produced more than 20 Mt of gold-copper ore, more than 9 Mt of gold-bearing quartzite, 4.8 Mt of barite- and barite-gold-bearing ores, more than 3 Mt of silver-lead-zinc ores, and not less than 110,000 t of arsenic ore. Since the 1930s, two mining-chemical enterprises had mined and processed arsenic ores from the Lukkhumskoye and Tsanskoye deposits to produce a variety of products, which had been shipped to enterprises throughout the Soviet Union (Dzhanelidze, Kuteliya, and Chokhonelidze, 2001).

As of 2001, only the Madneuli deposit was still being mined. The Government owned more than 98% of the shares of the joint stock company Madneuli; the remainder was owned by the workers. Madneuli is located close to the capital T'bilisi in a region with good energy and transport infrastructure. The deposit was open pit mined. Barite and barite-gold-bearing ores had been processed at the Madneuli beneficiation plant, which produced barite and gold-bearing sulfide concentrates. Because of a lack of demand for barite, the barite was no longer being processed but was being stored in special warehouses near the open pits (Dzhanelidze, Kuteliya, and Chokhonelidze, 2001).

In the process of stripping, barite-polymetallic (lead-zinc) and copper-zinc ores were produced that were not processed because of the lack of processing capacity and inadequate technology. These ores were stored in warehouses. About one-half of the deposit's explored reserves of barite-containing, barite-polymetallic, and copper-zinc ores had already been mined but were being stored where they were oxidizing and undergoing other changes to their chemical properties. Gold-bearing secondary quartzite ores were also being stored (Dzhanelidze, Kuteliya, and Chokhonelidze, 2001).

In 1997, the Georgian-Australian joint venture Quartzite Ltd. put into operation the Madneuli gold extraction plant with the capacity to produce 2 t/yr of gold at the open pit. The most significant ore reserves were gold-copper ores, which were processed at the Madneuli flotation plant, which exported the gold-copper concentrates. Expansion at Madneuli will depend on improving the technology for obtaining gold-copper and gold-pyrite concentrates, introducing heap leaching to produce copper from the low-grade ores being stockpiled, and introducing technology to produce high-quality barite and gold-bearing sulfide concentrates and to process copper-zinc and barite-polymetallic ores. Additional metals could be obtained by processing 22.7 Mt of tailings from the processing of gold-copper and barite-bearing ores at the flotation plant. These ores, which are being stored in two tailings ponds, contained 11.7 t of gold and 243.8 t of silver. The overburden from Madneuli could be processed to produce cement, ceramics, construction materials, packing materials, and turquoise jewelry. Also, additional exploration could increase the reserves of gold-copper ores (Dzhanelidze, Kuteliya, and Chokhonelidze, 2001).

Exploration in recent years has indicated the potential for the development of deposits of nonferrous, precious, and rare-metals ores and industrial minerals, such as antimony, arsenic, barite, gold, lead, and zinc. The country had not reevaluated its reserves according to the requirements for reserves for a market economy since they were evaluated during the Soviet era according to the Soviet reserve classification system for nonmarket economy conditions. The country could benefit from technologically upgrading its mineral industry from exploration through all stages of production (Dzhanelidze, Kuteliya, and Chokhonelidze, 2001).

Kazakhstan

Kazakhstan is the second largest country in land area after Russia to form from the republics of the FSU. It is endowed with large reserves of a wide range of fuels, industrial minerals, and metallic ores, and its metallurgical sector was a major producer of a large number of metals from domestic and imported raw materials. Its metal mining sector produced chromite, copper, iron, lead, and zinc ores, and its metallurgical sector produced such metals as beryllium, bismuth, cadmium, copper, ferroalloys, lead, magnesium, rhenium, steel, titanium, and zinc. The country had significant production of other nonferrous and industrial mineral products, such as arsenic, barite, gold, molybdenum, phosphate rock, and tungsten. The country was a large producer of mineral fuels, which included coal, natural gas, oil, and uranium. Revenues from oil production were a major contributor to the country's economy and will greatly increase as projects under development reach their projected targets and new major discoveries become developed (U.S. Energy Information Administration, 2002b§).

Kazakhstan has large reserves of mineral resources that are of world significance. According to the country's Ministry for Energy and Mineral Resources, Kazakhstan ranked first in the world in reserves of barite and tungsten; second in reserves of chromite, phosphate rock, and uranium; third in reserves of copper, lead, and zinc; fourth in reserves of molybdenum; sixth in reserves of gold; and eighth in reserves of iron ore (Shkol'nik, 2001).

When Kazakhstan acquired independence in 1991, it possessed a large mineral production complex. Since then, Kazakhstan pursued a policy of adapting to a market economy and privatization to preserve and develop its mineral industry.

In 2001, Kazakhstan's mining industry extracted 32 types of nonferrous, precious, and rare metals from which its metallurgical industry produced 70 types of metal products. Practically the entire minerals industry has undergone some degree of privatization. According to Kazakhstan's constitution, all mineral resources belong to the Government, which awards contracts to develop these resources for specific time periods. Despite an influx of investment in its mineral industry, the industry still faced several problems that included the direction of investment funds—increasing extraction (92%) and exploration (8%). Almost no funds were being directed towards exploring for metallic ores, which will result in the depletion of most of these ores at existing enterprises by 2020. Furthermore, extraction was to be used primarily on high-grade ores, which could exacerbate this situation (Shkol'nik, 2001). For example, the average grade of zinc ores at the Tishinskiy deposit is 6.6% zinc, but the ore being mined grades between 8.6% and 9.9% zinc, which could lead to its depletion by 2005 and make extraction of the remaining ore unprofitable (Shkol'nik, 2001).

The mineral industry accounted for about 60% of Kazakhstan's industrial production, and 95% of the mineral products produced were exported. About 75% of foreign direct investment was in the mineral production sector. The oil and gas sector followed by the nonferrous metals sector were the most significant sectors for exports and direct foreign investment (Ellmies, 2001, p. 9-13).

In 2001, the oil industry accounted for approximately 30% of the Government's budget revenues, and oil accounted for about one-half of Kazakhstan's export earnings (U.S. Energy Information Administration, 2002b§). Ferrous, nonferrous, and precious metals accounted for a significant part of the country's export earnings. In 2001, Kazakhstan exported $267.4 million in precious metals, which was 30% less than that of 2000. The country exported 822,600 t of ferroalloys, which was 3% less than in 2000. The value of ferroalloy exports, however, grew by 7% to $315.1 million. Exports of flat rolled products, which included tin plate, fell by 3% to 3.176 Mt; the value fell by 24% to $577.2 million. Lead exports fell by 16% to 131,200 t; the value fell by 15% to $54.7 million. Exports of refined copper grew 2% to 399,200 t; the value, however, fell by 9% to $609 million. Unprocessed zinc exports increased 2% to 235,800 t; the value, however, fell by 20% to $157.7 million. Exports of iron ore grew 38% to 7.385 Mt; the value, however, increased by 65% to $84.8 million. Imports of iron and steel products for railway tracks increased 110% to 65,800 t; the value increased by 140% to $22.8 million. Imports of iron and steel pipes grew 62% to 433,600 t; the value increased by 81% to $377.8 million (Interfax Central Asia and Caucasus Business Report, 2002d§).

With the dissolution of the Soviet Union in 1991, Kazakhstan experienced a severe economic crisis owing to its economy's dependence on trade with Russia. In the mid-1990s, the country's economy, which was heavily dependent on exports to Russia, began to experience a revival in industrial production.

This was disrupted by the Asian and the Russian financial crises of 1998; production at many of the country's industries came to a standstill, and the national currency, the tenge, was significantly devalued. The crisis of 1998 led to a rise in the country's trade deficit and foreign debt. Following this crisis, foreign investments in a number of projects were frozen or abandoned. In 1999 and 2000, however, the country experienced significant economic growth that continued into 2001. The increase in prices for mineral products, particularly oil, accounted for a significant part of the recovery (Ellmies, 2001, p. 9-13).

The mineral industry in the mid-1990s had been badly in need of investment and restructuring, which led to a large number of enterprises being put under foreign management through concessionaire contracts. A large percentage of mining and metallurgical enterprises had been put under the control of foreign managers, who, in exchange for a share of the profits and ownership rights to stock, were investing in modernizing the enterprises, increasing output, increasing exports, decreasing costs, and upgrading technology to meet environmental standards (Zharkenov, 1997).

In 2000, the country began a new round of privatization by offering to sell remaining Government shares in major mineral industry enterprises, such as the uranium producer KAZatomprom, the lead and zinc producer KazZink, and the Ust-Kamenogorsk titanium-magnesium plant (Ellmies, 2001, p. 9-13).

Kyrgyzstan

Kyrgyzstan has a wide variety of explored mineral resources, which has enabled the country to construct enterprises for the production of construction materials, fuels, and nonferrous and precious metals. Toward the end of the Soviet era in the late 1980s, Kyrgyzstan's mineral processing industries were supplying the Soviet Union with all its metallic antimony, 64% of its mercury metal, 80% of its rare-earth metals, 25% of its monocrystalline silicon, and 15% of its uranium (Kudayabergenov and Stavinskiy, 2001).

Between 1930 and 1985, the mineral industry played a leading role in Kyrgyzstan's economy through the development of enterprises to produce antimony, mercury, rare earths, and uranium and other metallic and nonmetallic resources. In 2001, the major operating mineral industry enterprises in the country were the Kadamzhay antimony mining and metallurgical complex, the Kumtor and Makmal gold mining enterprises, and the Khadarkan mercury mining and metallurgical complex. Many of the ores previously mined were complex ores often with high concentrations of primary metals and byproduct metals that were not extracted and were being stored in waste dumps with large quantities of resources (Bokonbayev, 2001).

The country is far from world centers of consumption and was planning to improve its transport network, which included its air, rail, and road systems. A law was passed that prioritized the construction of the Balykchi-Kara-Kechye-Dzhalal-Abad rail line, which will unite the northern and southern sections of the country with China and provide an export route through Torugart, China. Roads were also being planned for a direct route to China and for a route through other Central Asian countries to Europe and Russia.

As a result of denationalization, the level of privatization as of January 1, 2001, was 68.6% of the total enterprises that had been state owned on January 1, 1991. In 1998, privatization of monopolies in the basic sectors of the country's economy started. Among the enterprises in the minerals and energy sectors that Kyrgyzstan has been trying to privatize with the attraction of investments were the Kadamdzhay Antimony Complex, the Kara-Balta ore mining enterprise, the Kyrgyz Chemical Metallurgical Works, and Kyrgyzenergo [Kyrgyz energy] (Bishkek AKIpress, 2001§).

The Kyrgyz Government authorized the joint stock company Kyrgyzaltyn to represent the country in discussions with investors on the creation of joint ventures for gold development and to participate in such joint ventures and in the management of mineral development firms that would include those that were developing antimony, tin, and tungsten resources.

Exploration primarily for gold, high-quality silicon, platinum-group metals (PGMs), precious stones, and tantalum was being conducted on a limited basis by using Government funds. Since 1992, the budget for exploration has not exceeded $600,000 per year. Foreign investors were involved mainly in exploring for gold and included such firms as Barrick Gold Corporation, Cameco Corporation, Newmont Gold Company, Normandy Ltd., Phelps Dodge Corporation, TEK Corp., and others. Firms from Australia, Canada, Israel, Russia, and the United Kingdom have formed 14 joint ventures for gold exploration (Kudayabergenov and Stavinskiy, 2001).

All explored and developed oil and gas deposits are in the foothills of the Fergana Valley in the southern part of the country; there are seven oil, four gas and oil, two natural gas, and one oil-condensate deposits. Total oil resources were estimated to be 98 Mt, of which 13.3 Mt was considered to be extractable by using available technology. Explored natural gas reserves were estimated to be 7.6 billion cubic meters. Explored bituminous and lignite coal reserves were estimated to be more than 2 billion metric tons (Gt), of which 425 Mt was considered to be suitable for open pit mining; mining enterprises in production were estimated to have hundreds of years of reserves. Much of Kyrgyzstan has not been explored for hydrocarbons owing to a lack of funding (Kudayabergenov and Stavinskiy, 2001).

The country has explored reserves of such metals as bismuth, beryllium, copper, and silver, which are not being mined, but could be of commercial interest. Although the country was not mining iron ore, it does possess reserves that it considered to be economically suitable for development. It also possesses reserves of thorium, uranium, and zirconium, which it believed were of commercial interest. The country listed 227 explored deposits of nonmetallic resources, such as agglomerate, basalt, clays, dimension stones, graphite, fluorspar, gypsum, limestone, loam, mica, sand and gravel, sulfur pyrites, and wollastonite. These nonmetallic raw materials were being extracted from scores of enterprises (Kudayabergenov and Stavinskiy, 2001).

The country processed uranium ore that was mined in other countries at the Kara-Balta mining and metallurgical complex, which produced uranium oxide from natural uranium. Kara-Balta has the capacity to produce 1,200 t/yr of uranium oxide. Kara-Balta also produced refined gold and silver, chemical compounds of molybdenum, tin and tungsten from concentrates, and scrap from the production processes for these metals. The plant used hydrometallurgical processing and produced products that were exported to countries in Europe, the FSU, and North America. The raw materials processed by Kara-Balta were imported from Kazakhstan, Russia, and other countries of the CIS and were also produced domestically.

Kyrgyzstan has reserves of a number of nonferrous metals, such as tin and tungsten, with reserves that total 209,700 t and 124,000 t, respectively. Since 1992, the joint-stock company mining enterprise Enil'chek extracted between 30,000 and 70,000 t/yr of ore for the production of between 150 and 350 t/yr of tin and between 90 and 120 t/yr of tungsten in concentrate, which it shipped to Russia and other CIS countries (Kudayabergenov and Stavinskiy, 2001).

Reserves of mercury ore and complex mercury-antimony-fluorspar ores from the Chauvan, Khaydarkan, and Novoye Chonkoy deposits total about 20 Mt, and the Bol'shoy Khaydarkan deposit, about 11.6 Mt. These deposits form the base for the Khaydarkan mercury mining and beneficiation complex (Kudayabergenov and Stavinskiy, 2001).

Rare-earth metals reserves of the cerium and yttrium group at the Kutessay II deposit total 51,500 t. Ores from the Aktyuzskiy mining directorate, which mined this deposit, were processed by the Kyrgyzskiy Chemical and Metallurgical Plant (Kudayabergenov and Stavinskiy, 2001).

Total gold resources in Kyrgyzstan were estimated to be between 2,500 and 4,000 t, of which 1,000 t was at identified deposits. As of January 1, 2000, the Government had listed 471 t of gold reserves at 13 lode and 22 placer deposits with gold in placer deposits that totaled about 6 t. The largest gold deposits were Kumtor with 288 t; Taldy-Bulak Levoberezhnyy, 80.4 t; Dzheruy, 74.7 t; and Makmal, 25.5 t. About 45 deposits were considered to be of interest for future exploration, each estimated to have resources of more than 5 t of gold (Kudayabergenov and Stavinskiy, 2001). A preliminary assessment of the Kumyshtag silver deposit in Talasskaya Oblast indicated about 2,000 t of silver reserves in ore at a grade of up to 270 g/t silver, and another at the Aktyube-Karagoyskoye deposit in Oshskaya Oblast indicated 1,000 t of silver resources in ore at a grade of as much as 150 g/t silver (Kudayabergenov and Stavinskiy, 2001).

Kyrgyzstan is seeking not only to continue with the successful development of its gold resources, but to preserve its existing mineral production industries and to develop a range of its other mineral resources.

Russia

Russia accounted for about 14% of the world's total mineral extraction (Razovskiy, 2001). The mineral industry was of great importance to the Russian economy. Enterprises considered to be part of the mineral raw material complex contributed more than 70% of the budget revenues derived from exports; oil and gas were the chief export earners. Despite decreased total metal output compared with the Soviet period, Russia produced more aluminum, lead, and zinc in 2001. It produced, however, only about 20% as much tin compared with the Soviet period (Kozyrev and Karmanov, 2001).

Since 1995, Russian nonferrous metals output was generally increasing. Plans called for expanding nonferrous metals production capacity when necessary and where possible. Despite its economic importance and production potential in terms of facilities and resources, the nonferrous mining and metallurgy sector was experiencing a number of problems. Russian analysts rated only about 10% of the technology used in this sector as being "world class" (Yelyutin and others, 2001). Much of the technology was not state-of-the-art in terms of pollution abatement. Equipment at enterprises was wearing out, and products from many enterprises were not competitive on world markets. Labor productivity in this sector was almost one third below that of advanced industrialized countries, and energy expenditures per unit of output were between 20% and 30% higher (Yelyutin and others, 2001).

According to assessments of analysts from the Russian Federation Ministry of the Economy's Department of the Economics of Metallurgy, reserves were generally sufficient at the 1995 to 2000 levels of extraction to supply existing enterprises that had mined iron ore for at least 15 to 20 years and nonferrous metals for 10 to 30 years (Yatskevich, 2000). A major problem was that the resource base for enterprises in the nonferrous metals sector was not competitive in terms of quality with that of producers in other countries; only the resource base for antimony, copper, nickel, and, in part, molybdenum was considered to be of competitive quality (Sysoyev, 2000).

At the end of October, parliamentary hearings were held by the state Duma on the development and conservation of Russia's mineral-resource base. During the decade following independence, many of the operating enterprises, which had been depleting the highest grade ores at their deposits, left remaining reserves that are subeconomic. In 2001, about 50% of the explored reserves, in volume, were considered to be marginally economic. Production at a number of the major deposits for placer gold, natural gas, nonferrous metals, and petroleum was declining. Mining conditions were deteriorating as the depths and lengths of mine workings were increasing and ore grades were decreasing. Oil production rates have decreased because of declines in formation pressure. From 1990 to 2000, coal and oil production fell by more than 33%; gas production, by 9%; marketable iron ore, about 20%; steel, 45%; copper, molybdenum, nickel, titanium, and tungsten, between 11% and 63%; and rare-earth metals, more than 90% (Russian Mining, 2001).

Domestic consumption of mineral products fell by an even larger percentage. Still, additions to mineral reserves, such as bauxite, copper, gold, iron ore, lead, molybdenum, nickel, rare-earth metals, and zinc, were not compensating for their depletion. Accordingly, by 2010, Russia could face the depletion of about one-half of its reserves for bauxite, gold, lead, petroleum, phosphates, and silver; by 2015, copper, tungsten, and zinc; by 2020, coal and manganese; and by 2025, natural gas (Russian Mining, 2001).

The Federal program "Ecology and Natural Resources," which was developed in 2010, contained provisions for expenditures from the federal budget for replacement of the mineral resource base. A number of tax policies, which included the scheduled repeal of the depletion allowance in 2002, were expected to create conditions that will inhibit exploration and additions to the resource base (Russian Mining, 2001).

As a result of parliamentary hearings, recommendations were made to increase the state's participation in developing the country's resource base through 2025 based on promoting the principle of self-sufficiency, encouraging some exports, and restricting imports of minerals and fuels. Reforms were advocated for tax codes and licensing procedures; introducing antimonopoly laws to encourage the formation of medium-sized mining and oil and gas extraction enterprises; increasing Russia's participation in international organizations that deal with issues regarding the production, consumption, and sales of mineral products; and better delineation of the roles of the federal and regional authorities in mineral development (Russian Mining, 2001).

In 2001, Russia's gross domestic product (GDP) increased by about 5% compared with that of 2000. In 2001, output of nonferrous metals increased by 4.9% in value, and output of ferrous metals decreased slightly by 0.2% compared with that of 2000 (Interfax Mining and Metals Report, 2002al). For specific nonferrous metals commodities, production measured in physical output increased compared with that of 2000—for magnesium and its alloys, 43.3%; molybdenum concentrates, 25.7%; rolled titanium, 24.7%; cobalt (unspecified), 14.9%; lead metal, which included secondary, 14.6%; molybdenum metal, 8.3%; alumina, 7%; gold, 6.2%; brass (rolled), 5.9%; refined copper, 5.8%; bronze (rolled), 5.4%; copper in concentrate, 5%; zinc metal, 3.2%; aluminum, 1.9%; nickel (unspecified), 1.8%; and tungsten concentrate, 1.5%. Production decreased compared with that of 2000 for tin in concentrate, 19.6%, zinc in concentrate, 8.6%; lead in concentrate, 7.2%; bauxite, 3.9%; tin metal, 3%; and tungsten metal, 0.4% (Interfax Mining and Metals Report, 2002an).

Russia was operating its aluminum smelters at practically full capacity; and copper, zinc, and nickel metallurgical facilities were operating at 97.2%, 92.5%, and 84.4%, respectively, of capacity. In 2001, capital investment in the iron and steel industry increased by 12.8%, and in the nonferrous metals sector, by 31.6% compared with that of 2000 (Interfax Mining and Metals Report, 2002al).

Ferrous metals output decreased mainly because growth in output for steel pipes and finished rolled products slowed to 8.5% from 45.3% and to 0.9% from 14.8%, respectively, in 2000 compared with that of 2001. Furthermore, in 2001, production of electric furnace ferroalloys and iron ore decreased by 7.6% and 4.6%, respectively, compared with that of 2000.

In 2001, coal production increased; output increased in the Kuznetsk Basin, which was Russia's main coal-producing region, by 11.7% to 127.6 Mt (Interfax Mining and Metals Report, 2002ak). Russian oil production increased by 7.4%, but natural gas production decreased by somewhat less than 1% in 2001 compared with that of 2000. The fall in oil prices in 2001 contributed to slower growth in the country's GDP in 2001 compared with that of 1999 and 2000 when higher oil prices fueled Russia's economic growth.

Total profits decreased in the nonferrous metals sector—48.3% of all producers operated at a loss in 2001 compared with 41.1% in 2000. In 2001, profits decreased in the iron and steel industry to Rub32.7 billion (approximately $1.026 billion) compared with Rub65.1 billion (approximately $2.042 billion) in 2000. The percentage of enterprises that operated at a loss increased to 37% compared with 26% in 2000 (Interfax Mining and Metals Report, 2002al).

Domestic consumption had fallen drastically for most metals in the post-Soviet period. Exports, which comprised a very large percentage of production, generally exceeded 75% of output and reached 90% or more for certain commodities. The amount of domestic consumption of metals, however, was increasing. In 2001, domestic consumption of copper, nickel, and aluminum increased by 40.6%, 38.6%, and 7%, respectively, compared with that of 2000. In 2001, domestic rolled steel consumption was 23.6 Mt, which equaled 46% of total output. Domestic consumption of rolled steel and steel pipe increased by 8.8% and 3.8%, respectively, compared with that of 2000 (Interfax Mining and Metals Report, 2002al). A restoration of domestic demand for metals, which was still very weak, would be an essential component for achieving steady economic growth in the metals sector.

In 2001, Russian exports of core nonferrous metals decreased in value by $1.8 billion to $7.24 billion compared with that of 2000. Practically all exports of nonferrous metals were to countries outside the CIS and totaled $7.1 billion; exports to the CIS totaled $140 million. Aluminum accounted for 49.7% of the value of nonferrous exports, nickel, 14.4%; and copper 13% (Interfax Mining and Metals Report, 2002al).

In 2001, Russia exported between 72% and 83% of its nonferrous metals productions compared with between 80% and 90% in 2000. Russia exported 3.07 Mt of primary aluminum valued at $3.61 billion, 592,000 t of refined copper valued at $870.2 million, and 188,000 t of primary nickel valued at $1.06 billion (Interfax Mining and Metals Report, 2002af). Russian exports of nickel, aluminum, and copper decreased by 10%, 5%, and 2.5%, respectively, in tonnage in 2001 compared with those of 2000 (Interfax Mining and Metals Report, 2002al). In 2001, Russian exports of copper outside the CIS decreased by 8%; nickel, 5%; and aluminum, 4% compared with those of 2000 (Interfax Mining and Metals Report, 2002af).

In 2001, Russian exports of ferrous rolled metals to countries outside the CIS decreased by 23% to 7.81 Mt compared with those of 2000. Exports fell by 12% for ferroalloys to 336,700 t but rose by 63% for pig iron to 5.8 Mt. Russia exported 13.67 Mt of iron ore products, which was 11.1% less than that of 2000. These included 6.56 Mt of iron ore concentrate, 6.3 Mt of pellets, and 814,000 t of agglomerate (Interfax Mining and Metals Report, 2002ae, ag).

Scrap and waste exports shrank dramatically because of high export duties that were imposed. In an effort to avoid these duties, exporters increased exports of aluminum and copper manufactured products, which were intentionally to be used as scrap rather than for their nominal purpose. Ferrous scrap exports also decreased but by a far lesser extent (Interfax Mining and Metals Report, 2002al).

A major problem that confronted the metallurgical industry was the sharp increase in scrap exports. From 1995 to 1998, exports of steel scrap increased to 356,500 t/yr from 28,600 t/yr, and those of aluminum scrap, to 367,300 t/yr from 11,900 t/yr. A number of entrepreneurs began to export scrap and thefts of equipment to sell as scrap were numerous. Besides the economic and safety problems that arose from dismantling equipment and infrastructure for scrap, problems also arose from scrap being exported that had radioactive and other chemical contaminates. The Russian Government passed laws and enacted regulations to try to control the export of scrap. In 2001, scrap and waste exports shrank by 88% compared with those of 2000 owing to high export duties but also to the fact that exporters acted to avoid these duties by exporting aluminum and copper products actually intended for use as scrap (Interfax Mining and Metals Report, 2002al).

In 2001, Russia, which was the world's largest natural gas exporter and second largest oil exporter, increased its natural gas exports and net oil exports. In December, however, in accordance with a request from the Organization of Petroleum Exporting Countries (OPEC), of which Russia was not a member, Russia pledged to reduce its oil exports in the first quarter of 2002. Because the Russian Government maintained a lower price than the world price for natural gas sold on domestic markets, the natural gas production industry was heavily dependent on exports as a source of revenue. To maintain its level of gas exports in light of decreasing production and increasing domestic consumption, Russia was contracting to purchase additional gas from Turkmenistan (U.S. Energy Information Administration, 2002c§).

In March 1999, Russia signed the Kyoto Protocol on limiting greenhouse gasses, but had not ratified it. Russia was the third largest emitter of greenhouse gasses after the United States and China; Russia's emissions were double those of Germany and Japan, which ranked fourth and fifth, respectively. Under the protocol, Russia would not have to reduce emissions, but rather maintain emissions at their 2001 level from 2008 to 2012. Russia's commitments were based on the fact that its 2001 level of emissions were about 25% below that of its 1990 level of emissions, which was considered to be the base level. According to forecasts that were substantiated by the Russian Government in its "Energy Strategy Until the Year 2020," Russia's emissions will remain below its base level during the coming decade. Under the protocol, Russia would be required to establish a national emissions control system to monitor and control emissions. Russia was considered to have the potential to increase energy efficiency and to achieve energy savings (Kokorin, 2001).

Tajikistan

Tajikistan is a mountainous country in Central Asia; altitudes range from 300 to 7,450 m above sea level; up to 93% of the country's territory is mountainous with the highest parts in the Pamir and Tyanshan mountain ranges. Almost one-half of the territory of the country is located at altitudes above 3,000 m. The majority of the population, however, lives in the mountain valleys.

In the early 1930s, the Soviet Government began a systematic study of the country's resources. Since then, more than 400 deposits have been explored for such minerals as antimony, boron, celestite, construction materials, fluorspar, gas, gold, iron, lead-zinc, mercury, molybdenum, oil, salt, silver, decorative stone, and tungsten. In a number of deposits, commercial quantities of bismuth, cadmium, gallium, germanium, indium, selenium, thallium, tellurium, and other elements have been found in the ores.

The country was producing aluminum, antimony, arsenic, boron, celestite, cement, coal, construction materials, fluorspar, gold, lead and zinc, mercury, molybdenum, natural gas, petroleum, semiprecious and decorative stones, salt, silver, strontium, tin, tungsten, and uranium. During the Soviet period, open pits, underground mines, and mining and beneficiation complexes and processing plants were established for the production of chemical raw materials, fuels, nonferrous metals, and nonmetallic mineral products. Its reserves of antimony, boron, lead, silver, and zinc enabled Tajikistan to occupy a leading place among the republics of the Soviet Union. According to the reserve classification system that was used in the Soviet Union, the country has what are termed "industrial reserves" of metals, which include bismuth, cadmium, copper, gallium, germanium, indium, tellurium, thallium, selenium, and others (Orifov and Dzhanobilov, 2001).

The Karamazar region was the major region where mineral deposits were developed. By 1934, the Kansayskoye lead-zinc mining complex and the Takaeliyskiyi metallurgical plant had been constructed in this region. Before the outbreak of World War II, coal, gas, lead-zinc, rare-earth metals, load and placer gold, and oil deposits were discovered at Karamazar.

By 1939, the country's first coal mine was commissioned at Shurab, and the Altyn-Topkan and the Adrasman lead-zinc mining and beneficiation complexes were constructed. During World War II, the KIM oil well and the Shurab coal deposit were commissioned; at the Marguzor-Magianskiye deposits, alluvial mining began for the production of antimony concentrates. During this same period, production began of tungsten concentrates for the Soviet Union's defense needs at the Chorukh-Dayron deposit. Production also began for the defense industries of antimony at the Shing-Magianskiye group of deposits, arsenic at the Mosrif deposit, tin and tungsten at the Takfon deposit, and tungsten at the Maykhura deposit (Orifov and Dzhanobilov, 2001).

During the war years, uranium deposits were collocated at the Adrasman, Taboshar, and other lead-zinc polymetallic deposits in the Karamzar region. These deposits became the basis for the establishment of complex No. 6 for the extraction and processing of uranium ore. By 1935, a processing unit had been commissioned to treat uranium ore at the Taboshar mining complex. These uranium deposits became the basis for the Soviet Union's uranium industry and supplied the uranium for the Soviet Union's first nuclear reactor (Orifov and Dzhanobilov, 2001).

The largest enterprise in the mineral sector and one of the largest primary aluminum plants in the FSU was the Tajik aluminum plant (Tadaz) in Tursunzada in the southwestern part of the country. It had the capacity to produce about 520,000 t/yr of primary aluminum; its entire alumina supply was to be imported.

During the 1990s, only a few mineral production enterprises were still operating, and production at some of these had halted by the end of the decade. These included the Adrasman mining and beneficiation complex, which developed copper-bismuth and lead-silver ores for processing in other regions of the FSU, in particular the Shymkent lead plant in Kazakhstan; the Altyn-Topkan mining directorate, which developed the Altyn-Topkan and Paybuylak lead-zinc deposits and supplied concentrates to metallurgical facilities at the Almalyk mining and metallurgical complex in Uzbekistan until 1997; and the Anzob mining and beneficiation complex, which mined the reserves of the Dzhikrutskoye antimony-mercury deposit and supplied metallurgical enterprises in Kyrgyzstan. Owing to a lack of operating funds, production at Adramsman and Altyn-Topkan had practically ceased by 1997 (Orifov and Dzhanobilov, 2001).

The Adrasman mining and beneficiation complex (formerly the Adrasman lead-zinc mining and beneficiation complex) was founded in 1967 on the base of the former chemical production shop of the Leninabad mining/chemical complex; it was subordinate to the Soviet Union's Ministry of Medium Machine Building, which controlled much of the defense-related production. Until 1997, the beneficiation plant at Adrasman had been processing copper-bismuth and lead-zinc ores. The concentrates were shipped to metallurgical facilities in the CIS, particularly the Shymkent lead plant in Kazakhstan. In 1985, the beneficiation plant was reconstructed to increase its processing capacity to 650,000 t/yr from 450,000 t/yr of ore from the Komimansurskoye deposit. Although Adrasman had been producing concentrates for the production of bismuth, copper, fluorspar, gold, silver, and zinc, the most valuable component of the ore mined at Adrasman was silver (Orifov and Dzhanobilov, 2001).

Owing to a lack of funds, production at Adrasman practically ceased in 1997. Restoration of production at Adrasman, which is located in an area with reportedly significant reserves of lead-zinc, lead-silver, fluorspar-silver, and copper-bismuth ores, was considered to be feasible. The fluorspar content of commercial grade ores was, on average, 23.5%, which enabled the production of fluorspar concentrate. The silver content of the ores was 85.5 g/t. The copper-bismuth ores contained 0.71% copper, 0.1221% bismuth, 152.2 g/t silver, and 0.95 g/t gold. Main output of Adrasman included concentrate with a lead content of 43% and a silver content of 5,943 g/t. Future processing of copper-bismuth and fluorspar-silver ores would not require renovation of the plant. Commercially produced bismuth concentrates contained 2.03% bismuth, 12% copper, and 2.844 g/t silver. Fluorspar-silver ores were processed in a separate section; a sulfide product was produced that contained 1,360 g/t silver and a fluorspar concentrate that contained 92% calcium fluoride (Orifov and Dzhanobilov, 2001).

Near the Adrasman complex, which had been developing the Konimansur deposit, was the Bol'shoy Konimansur deposit, which had undergone detailed exploration during the Soviet period. It was the largest polymetallic silver porphyry deposit in the FSU. Plans had called for construction of a mining enterprise with the capacity to mine 15 Mt/yr of ore, but following the dissolution of the Soviet Union, these plans were indefinitely postponed (Orifov and Dzhanobilov, 2001).

Gold mining had begun during the Soviet period. The Tadzhikzoloto production association organized placer mining production at four alluvial placers of the Yak-Suyskoye deposit in the southern part of the country. The civil war of the 1990s, however, practically ended these placer mining operations. In 1995, Darvaz, which was a Tajik-British joint venture, was formed to develop the Yak-Suyskoye deposit, which had explored reserves of about 17 t in Khatlonskaya Oblast; production was slowly being reinstituted (Orifov and Dzhanobilov, 2001).

In 1985, the Kansaykskaya factory, which had been processing lead-zinc ores, was reconstructed to process 165,000 t/yr of gold-bearing ores from the Aprelevka, Burgunda, Kyzyl-Cheku, and Shkol'noye deposits by using gravitation-flotation technology. Based on the Kayrakkumskiy mining enterprise, the Aprelevka joint venture was formed in 1997; the Canadian firm Graf International Ltd. was to mine gold ores from the above deposits and others. As of 2001, the Aprelevka joint venture had not produced any gold (Orifov and Dzhanobilov, 2001).

The country's largest gold deposits are located in the Zeravshan valley, where, during the Soviet period, the Chore, Duoba, Dzhilau, and Taror deposits were prepared for development. A gold-mining complex and accompanying infrastructure was built on the base of the Taror deposit near the village of Pendzhikent. Mining began during the Soviet period but ceased after the dissolution of the Soviet Union. On the base of the existing complex, the Zeravshan joint enterprise was created in 1994 by the Government of Tajikistan (51%), Commonwealth and British Minerals (CBM) of the United Kingdom (a wholly owned subsidiary of Nelson Gold Corporation Limited) (44%), and the International Finance Corporation (5%). CBM controlled and managed production at the enterprise. In 2001, Zeravshan was mining gold ore from the Dzhilau open pit for processing at its plant, which crushed the ore and also used a leaching method to extract gold; the gold was then sent for refining (Orifov and Dzhanobilov, 2001).

The country mined decorative and precious and semiprecious stones, such as agates, amethyst, clinohumite, granite, laurite, marble for dimension stone, onyx marble, rubies, and spinel and tourmaline marbles. Marbles that are quarried from the Dal'yan deposit in the Shakhristankiy region, the Dashtak deposit in the Darvaz region, and the Tilyagul' deposit in the Pendzhikent region are distinguished by their highly decorative quality. The Yavan electrochemical complex processed dolomite from the Paskhivskoye deposit and salt from the Tut-Bulakskoye deposit to produce chemical raw materials. The Dushanbe cement complex developed the Kharangonskoye limestone deposit and the Varzobskoye loam deposit.

Until recently, practically all salt consumed in Tajikistan was imported from other CIS countries. In 2001, however, the country was able to satisfy its salt requirements almost completely through the development of the Kamysh-Kurganskoye and the large Khodzha-Muminskoye deposits by the Ashtskiy and Voseyskiy salt plants, respectively (Orifov and Dzhanobilov, 2001).

The country's fuel requirements had been met almost completely through imports of oil products and coal from other CIS countries. Previously, Tajikistan had extracted between 700,000 and 800,000 t/yr of coal and between 300,000 and 350,000 t/yr of crude oil. By 2001, the extraction of coal and oil did not exceed 50,000 t/yr, and plans called for reviving and expanding fuel production (Orifov and Dzhanobilov, 2001).

Turkmenistan

Turkmenistan has a variety of unevenly distributed mineral deposits. More than 80% of the country's territory is composed of the Kara-Kum Desert, with mountainous regions in the west and south (Kopet-Dag Range) and the foothills of the Zeravshan and Tyan-Shan' ranges in the east. The country's major mineral resources are its oil and gas reserves; Turkmenistan was one of the leading countries in the world in the quantity of its natural gas reserves (Odekov, Krasil'nikov, and Bumshmakin, 2001).

The country's leading nonfuel mineral enterprises were the Arpaklenskiy barite-witherite and the Cheleken ozokerite mining enterprises, the Gaurdak sulfur plant, the Karabogazsulfate association, the Kara-Kum sulfur plant, and the Oglanlinskiy bentonite mining enterprise (Odekov, Krasil'nikov, and Bumshmakin, 2001).

One of the largest enterprises that extracted chemical raw materials was the Karabogazsulfate association. The raw material base for this enterprise was the Kara-Bogaz Gol lagoon off the Caspian Sea where production began in 1940. The association produced bischofite, epsomite, Caspian Sea salt, Galauber's salt, and sodium sulfate (Odekov, Krasil'nikov, and Bumshmakin, 2001).

In the western part of the country, the Boyadagskoye, Cheleken, and Nebitdag deposits of iodine-bromine waters were under development. The productive horizons are at depths of between 400 to 800 m; the average iodine content of the waters was between 26 and 35 milligrams per liter (mg/L); and the average bromine content ranged from 380 to 400 mg/L. The waters were processed at the Cheleken and the Nebitdag iodine-bromine plants (Odekov, Krasil'nikov, and Bumshmakin, 2001).

All the deposits in Turkmenistan were being developed by enterprises subordinate to the Ministry of the Oil and Gas Industries and of Mineral Resources, the Ministry of Energy, and the Ministry of Construction Materials. For various reasons, which included the breakdown of economic contacts among the countries of the CIS, the decrease in mineral extraction was large. Since 1998, however, this trend reversed. The Government program, A Strategy for the Social-Economic Development of Turkmenistan to the Period of 2010, called for conducting exploration for iron ore, nonferrous metals, radioactive metals, rare metals, alunite, bentonite, fluorspar, phosphates, and zeolites and a range of construction materials. This exploration was planned to result in the development of new deposits. For those already explored deposits, the main goal will be to widen the assortment and to improve the quality of mineral products, in part, by reequipping enterprises in the mining sector and conducting market research to enable the country to sell its goods on world markets more effectively (Odekov, Krasil'nikov, and Bumshmakin, 2001).

As of 2001, Turkmenistan had an inventory of 162 nonfuel mineral deposits with confirmed reserves, these included 2 deposits of celestite, 10 of mineral salts (7 of sodium and 3 of potash), 2 of kaolin, 2 of natural sulfur, 3 of coal, 1 of bentonite, 2 of ozokerite, 1 of natural pigments, 2 of carbonate material for soda production, 7 of barite, 2 of marble onyx, and 128 of various construction materials, which included 3 deposits of gypsum; 3 of cement raw materials; 3 of glass raw materials; 7 of dimension stone; and 5 of filing stone. Of these deposits, 62 were under development.

The country had developed the Kugitangskoye polymetallic ore deposit near the city of Gowurdak in the southwestern part of the country. The lead-zinc ores were mined by underground methods from 1942 to 1967. The mine was closed owing to the depletion of the ore (Odekov, Krasil'nikov, and Bumshmakin, 2001).

In the 1970s, the country explored two large strontium deposits, the Arikskoye and Sakrytminskoye, in the region near the city of Gowurdak. The reserves at each deposit were said to be in the millions of metric tons. The Arikskoye deposit was mined by open pit methods from 1986 to 1991; during this period, 85,000 t of celestite concentrate was produced that was processed in Tajikistan and in the Ukraine. After the beneficiation plant at the mine was closed in 1992, small amounts of rich ore were extracted for the production of celestite for weighting materials for drilling solutions (Odekov, Krasil'nikov, and Bumshmakin, 2001).

The country also had one of the first developed uranium deposits in Central Asia; it is located 250 km to the northeast of Turkmenbashy. Mining of ore that averaged 2% uranium began in 1955. The deposit was first developed by sinking 10 underground shafts and then by open pit mining. Mining ceased at an unspecified time in the past owing to the depletion of reserves (Odekov, Krasil'nikov, and Bumshmakin, 2001).

Along with oil and gas, the country produced coal from the Tuarkyrskoye deposit of oxidized coal. This deposit is located 250 km to the southeast of the port city of Turkmenbashy. The ash content of the coal is between 22% and 30%, and the output of humic acid was between 30% and 98%. This deposit was being developed from small open pits for the production of chemical raw materials. Sections of the deposit could be developed by underground mining to supply fuel for local use (Odekov, Krasil'nikov, and Bumshmakin, 2001).

Development of the Oglaninskoye bentonite deposit began in 1934. Ore was mined by the open pit method. The peak output was 100,000 t/yr of lump bentonite. Until 1992, bentonite from Oglaninskoye was shipped to 70 enterprises in the FSU for use in iron ore concentration and porcelain ceramics production. In 1999, a plant with a 50,000-t/yr capacity to produce bentonite powder was commissioned. Remaining confirmed bentonite reserves equaled 14 Mt (Odekov, Krasil'nikov, and Bumshmakin, 2001).

The Bakhardenskoye quartz sand deposit, which is located 15 km from the Bakharden railroad station, had reserves of 2.4 Mt, which were being developed by open pit to supply the Ashkhabad glass plant. Production was stopped in 1972 owing to requirements for the higher quality raw materials that were imported from Russia and Tajikistan; production, however, resumed again in 1994. The Kelyatinskoye dolomite deposit, which is located 80 kilometers to the northwest of Ashkhabad, was being developed by open pit mining; it will supply the Ashkhabad glass plant. It had reserves of 3.39 Mt and extracted about 6,000 t/yr. The Badaurmazskoye and Annauskoye deposits, with reserves of 6 Mt and 600,000 t, respectively, also supplied quartz sand to the Ashkhabad glass plant. The Kyzylkainskoye kaolin-bearing sand deposit, which is located 250 km to the north-east of Turkmenbashy, with reserves of 29.6 Mt had a complex raw material used for the production of artificial leather and cloth, electronic goods, fine ceramics, glass for packaging and illumination, sanitary engineering and china earthenware goods, and sheet glass. The sands in their natural form are suitable for producing refractory bricks. The deposit was developed by open pit mining since 1995, and 80,000 t/yr was extracted. The raw material was processed at the Ashkhabad kaolin plant, which produced 20,000 t/yr of kaolin concentrate. The kaolin plant began operations in 1997. In producing the kaolin concentrate, the sand siftings were not used in glass production, although they would be suitable for use in glass manufacturing after processing (Odekov, Krasil'nikov, and Bumshmakin, 2001).

The Tuarkyskoye secondary kaolin deposit, which is located 9 km from the Kyzylkainskoye deposit, had reserves of 4 Mt that are suitable for use in producing sheets of ceramic facing stone and as an additive in the production of refractory goods. The deposit had been prepared for industrial development. The Bakhchganyncheshme natural pigment deposit, which is located 28 km southwest of the city of Serdar, had reserves of 77,800 t and comprises oxidized sulfide ore suitable for the production of brown, red, and yellow pigments after treatment. The deposit has not yet been developed (Odekov, Krasil'nikov, and Bumshmakin, 2001).

The Gowurdak native sulfur deposit, which is located in the southeastern part of the country 260 km from the city of Turkmenabat (formerly Chardzhou), was mined by underground methods from 1935 to 1964 and then by open pit mining. Since 1971, the deposit was also mined by using the Frasch process. Peak production was achieved in 1990 with the extraction of 1.7 Mt of ore to produce 478,000 t of sulfur. Since 1997, mining has ceased because of the inability to market output profitably. Remaining sulfur reserves were 18.3 Mt (Odekov, Krasil'nikov, and Bumshmakin, 2001).

The Kara-Kum sulfur deposit, which is located in the center of the Kara-Kum Desert 250 km to the north of Ashkhabad, was mined from 1930 to 1961 by open pit methods. The sulfur was processed at two plants in the villages of Darvaz and Zeagli. The exploitation of this deposit ceased owing to the depletion of reserves and the development of the Gowurdak deposit. Other sulfur deposits include the Kugitangskoye deposit with 9.1 Mt of reserves of sulfur suitable for development by using the Frasch method (Odekov, Krasil'nikov, and Bumshmakin, 2001).

The Karlyuk potash deposit, which has sylvinite seams or sylvinite mixed with carnallite, had reserves of 2.017 Mt potassium oxide (K_2O) with the K_2O content of the ore 18.41%; it is located 55 km from the city of Gowurdak. The potash is considered to be suitable for use as fertilizer. In 1975, an experimental solution mine was commissioned, and plans called for constructing the Central Asia potash complex. In 1997-98, however, the experimental mine was dismantled. The Karabilk'skoye potash deposit, which is located 17 km to the south of Gowurdak, is analogous to Karalyuk in type and amount of reserves, but was not developed (Odekov, Krasil'nikov, and Bumshmakin, 2001).

The Kuulinskoye native salt deposit, which is located 40 km to the north of Turkmenbashy, is coincident with a 200-km^2 salt lake on the banks of the Caspian Sea. Following extraction and remaining 1 year in mounds, the salt is considered to be first-class table salt and also suitable for the production of caustic soda, chlorine, and soda ash. Peak output was 650,000 t/yr. The salt was exported to Armenia, Azerbaijan, Bulgaria, Kazakhstan, Russia, Sweden, Uzbekistan, and Yugoslavia. By 2001, however, production had fallen to 250,000 t/yr. Reserves were listed at 36.7 Mt (Odekov, Krasil'nikov, and Bumshmakin, 2001).

The Babakhodzha common salt deposit, which is located 20 km to the south of the city of Balkanabat, is a 28,000-km^2 dry salt lake. The salt corresponds in quality to feed and industrial salt, with reserves of 7.3 Mt. The deposit was under some development until 1980 but has not been worked since then (Odekov, Krasil'nikov, and Bumshmakin, 2001).

The Gowurdak rock salt deposit, which is located 8 km from Gowurdak, is suitable for underground solution mining. The salt reserves of 1.849 Mt can be used as raw material to produce caustic soda ash and in chemical water treatment. Extraction was 15,000 t/yr (Odekov, Krasil'nikov, and Bumshmakin, 2001).

The Kugintanskoye rock salt deposit, which is located 75 km from Gowurdak, is analogous to the Gowurdak deposit. The salt in its natural state is suitable for feed and industrial uses, but after processing, it is suitable for table salt. Reserves suitable for underground mining were 19.6 Mt in 1933. The deposit has been periodically developed with an output of about 2,000 t/yr. The salt was exported to Kazakhstan and Uzbekistan (Odekov, Krasil'nikov, and Bumshmakin, 2001).

The Khodzhakiyamskoye rock salt deposit, which is located 4 km west of Gowurdak, had reserves of 100.9 Mt confirmed in 1998 that are suitable for underground mining and industrial use. The deposit has not been developed (Odekov, Krasil'nikov, and Bumshmakin, 2001).

The Uzunkuduksoye rock salt deposit, which is located 20 km from Gowurdak, had reserves of 886,000 t suitable for open pit development and for use as animal feed. The deposit was being mined at the rate of 2,000 t/yr. The salt was used in Turkmenistan and exported to Kazakhstan and Uzbekistan (Odekov, Krasil'nikov, and Bumshmakin, 2001).

Hydrothermal barite deposits were being mined in the region of the village of Kara-Kala in the western part of the country. A group of small deposits are distributed over an area of more than 5,000 km^2. Barite extraction began in the 1920s at the Kumytash deposit. In 1930, on the base of the Arpaklen deposit, the first witherite mine in the Soviet Union was developed. Arpaklen and a group of small witherite deposits were mined until the middle of 1941. Peak production of barite witherite reached 10,000 t/yr with about 100,000 t of barite and witherite ore extracted (Odekov, Krasil'nikov, and Bumshmakin, 2001).

Deposits of the limestone that is used in the chemical industry were explored in the Gowurdak-Kugitanskiy region. The Gowurdak limestone deposit, which is located 4 km to the northeast of Gowurdak, had reserves of 205.3 Mt confirmed in 1970. The limestone is suitable for soda ash production. The deposit was not developed. The Karadzhumal'skoye limestone deposit, which is located 60 km from Gowurdak, had reserves of 105.1 Mt confirmed in 1970. The limestone is suitable for soda ash production. This deposit also was not developed (Odekov, Krasil'nikov, and Bumshmakin, 2001).

The country has seven explored reserves of materials for facing materials—the Krasnovodskoye deposit of tuff and granites, and the Charshanginskoye, Geopktepinskoye, Gowurdakskoye, Kaylyu, Tagarinskoye, and Tyuzmergenskoye limestone deposits. Reserves from these deposits have been confirmed as suitable for producing slabs for inside applications in buildings. The Tagarinskoye deposit, which is located 8 km from Gowurdak, produced about 1,000 cubic meters per year of material from a quarry (Odekov, Krasil'nikov, and Bumshmakin, 2001).

The country has three deposits that contain raw materials for cement production—the Bezmenskoye bench gravel and loam deposit, the Gingol'skoye limestone and marl deposit, and the Kugintanskoye limestone and clay deposit. The Bezmenskoye deposit, which is located near Ashkhabad, had been mined since 1950 and supplied the Bezmenskiy cement plant, which was the country's only cement plant. In 1996, extracted bench gravel totaled 1.2 Mt, and extracted loam, 120,000 t. Remaining reserves at the deposit are 41.6 Mt of bench gravel and 11.9 Mt of loam. In 2000, the Bezmenskiy cement plant was moved to the village of Kelyata, which is located 90 km to the west of Ashkhabad (Odekov, Krasil'nikov, and Bumshmakin, 2001).

The country has three deposits of gypsum and anhydride—the Bordzhaklinskoye, Gowurdak, and Krasnovodsk; the Bordzhaklinskoye was not mined. The Gowurdak, which is located 2 km northwest of the city of Gowurdak, immediately abuts the Gowurdak sulfur deposit. The gypsum from this deposit is suitable for the production of gypsum molding plaster and construction solutions and as an additive in cement and sulfuric acid production. The deposit has been mined since 1974, but production had been sharply curtailed since 1992. The gypsum had been used by cement plants in the Soviet Union (the Central Asian republics and Siberia) and exported to Sweden and Denmark. In 2001, small amounts of gypsum were shipped to the cement plant in Kelyata. Gypsum reserves at Gowurdak reportedly were 63.8 Mt. In the 1980s, the Krasnovodsk deposit, which is located 9 km to the east of the city of Turkmenbashi, was producing from about 150,000 to 160,000 t/yr, but by 2001, production had been reduced to 25,000 t/yr of gypsum (Odekov, Krasil'nikov, and Bumshmakin, 2001).

The country has five deposits that were used to supply raw material to produce keramzit, which is a light-weight concrete aggregate; only the Yagmanskoye argillite deposit, which is located 45 km to the northwest of the city of Balkanabat, was being mined. This deposit has been mined since 1978, and annual production reached 200,000 cubic meters. Argillite was used by five keramzit plants in the country and also by a number of plants in Kazakhstan and Uzbekistan. Remaining argillite reserves were 36.2 million cubic meters (Odekov, Krasil'nikov, and Bumshmakin, 2001).

The country has six explored limestone deposits that were suitable for the production of filing stone; four were being mined. The Aeroport deposit, which is located 21 km northeast of Turkmenbashy, had reserves of 23.1 million cubic meters and output of 2,000 cubic meters per year; the Mukrinskoye deposit, which is located 20 km southwest of Gowurdak, had 18.8 million cubic meters of reserves and output of 25,000 cubic meters per year; the Bekdashskoye deposit, which is located 200 km to the north of Turkmenbashy, had reserves of 10.1 million cubic meters and output of 5,000 cubic meters per year; and the Dostluksoye deposit, which is located 230 km to the southeast of Turkmenabat, had reserves of 734,000 cubic meters and output of 2,000 cubic meters per year (Odekov, Krasil'nikov, and Bumshmakin, 2001).

The country has many deposits of raw materials that were suitable for construction materials, of which the most notable were the Ufrinskoye deposit for the production of gravel, which had output of 900,000 cubic meters per year; the Dushaksoye sand and gravel deposit, which had output of 1.15 million cubic meters per year; the Kalaimorskoye sand and gravel deposit, which had output of 925,000 cubic meters per year; the Kubatayskoye deposit of granites, which were used for the production of gravels and had output of 740,000 cubic meters per year; and the Kernayskoye deposit of sands and shale, which were used for the production of gravels and had output of 36,000 cubic meters per year (Odekov, Krasil'nikov, and Bumshmakin, 2001).

Ukraine

Ukraine is the largest country solely in Europe in land area. At the end of the 1980s, Ukraine mined about 5% of the world's output of mineral products (Gurskiy and Kalinin, 2000). Since the breakup of the Soviet Union, production in Ukraine's mineral sector had fallen precipitously. Nevertheless, in 2001, Ukraine continued to be a major world producer of coal, ferroalloys, ilmenite, iron ore, manganese ore, and steel.

The country had been a lesser producer of a number of other metallic mineral products, which included alumina, aluminum, cadmium, germanium, secondary lead, magnesium, mercury, nickel, rutile, uranium ore, secondary zinc, zircon, zirconium, and a large number of industrial minerals, which included dolomite, graphite, kaolin, limestone fluxes, potash, quartz, salt, soda ash, and a variety of building materials. Because of the large reduction in demand that followed the breakup of the Soviet Union, Ukraine sharply reduced or ceased producing a number of these commodities. Based on the former economic importance of Ukraine's mineral industry, its large amounts of capital stock and infrastructure, and its employment of a significant segment of the work force, its successful functioning was considered to be critical for the country's economic renewal (Gurskiy and Kalinin, 2000).

Ukraine's mining and metallurgical complex consisted of about 300 enterprises, which included 35 secondary metals plants, 30 scientific research and design organizations, 26 mining enterprises, 20 nonferrous metals plants, 17 iron and steel mills, 17 refractory production plants, 16 coke-chemical plants, 10 metals goods plants, 7 pipe plants, and 3 ferroalloys plants. The complex employed 500,000 persons, 270,000 of which were employed at ironmaking and steelmaking and ferroalloys enterprises (Kharakhulakh, 2001).

After a decade-long decline, Ukraine's GDP increased by 6% in 2000 compared with that of 1999 and by 9% in 2001 compared with that of 2000. Ukraine had experienced about a 60% contraction in economic activity from 1992 until 2000. Thus, the recovery that began in 2000 was of prime importance. Industrial production, which accounted for about one-third of the GDP, grew by 14% compared with that of 2000. Among the industrial sectors that showed exceptional growth in 2001 were the ferrous and nonferrous metals sectors and the machine-manufacturing sector. Output in the fuel sector, however, declined owing to a sharp reduction in oil refining (Berengaut and others, 2002).

For 2001, Ukraine reported monthly growth rates in the mining sector, which included extraction of mineral fuels, ranging from 3.3% to 8.8% compared with comparable months of the previous year. In the metallurgical sector, the increased growth rates ranged from 4.9% to 27.4%; in all but 4 months, the growth rates were more than 10%. Other increases in production in 2001 compared with 2000 were reported for soda ash, 13.2%; rolled steel, 12.4%; cement, 8.9%; crude steel, 5.5%; synthetic ammonia, 3.4%; and sulfuric acid, 0.3%. Decreases were reported for steel pipes, 4%, and caustic soda, 0.1% (Berengaut and others, 2002).

Ukraine's economic recovery in 2000 was led by its strong 26% growth in exports, in terms of U.S. dollars, compared with those of 1999. Russia, which was Ukraine's leading trading partner, accounted for 23% of Ukraine's total exports in 2000. Ukraine exported aluminum, crude steel, iron ore, rolled ferrous metals, and steel pipes. In 2001, Ukraine's growth in exports was 10% compared with that of 2000. Destinations of exports and major export items remained similar to those of 2000. Russia, which remained the leading destination, accounted for 22% of Ukraine's total exports. Metals and metal products were the key category of exports and composed 41% of total exports despite antidumping actions and a less favorable world market for steel. Chemical products, machinery, and minerals remained important export categories, each accounting for about 10% of total exports (Berengaut and others, 2002).

On July 14, 1999, the Ukrainian Parliament adopted a law conducting an economic experiment at the enterprises of mining and metals companies that pertains to coke enterprises, foundries, iron ore beneficiation plants and mining enterprises, steel mills, and pipe plants. This law provided tax benefits for mining and metal industry firms from July 1999 through January 2002. The law attempted to help Ukrainian firms increase their working capital to upgrade production facilities and avoid barter transactions in purchasing critical supplies, such as energy and fuel (U.S. Embassy Kiev, Ukraine, 1999§).

After 10 years of independence, Ukraine's energy industry was in a state of crisis despite all efforts undertaken by the Government to alleviate the problem, and the country was not being adequately supplied with energy. The most important energy resource was coal, which accounted for 90% of all production of domestic energy resources. Conditions for its extraction, however, were among the most difficult in the world. The coal industry required a large investment because of the poor condition of the mines and the depreciation of equipment. Explored reserves of oil and gas are not large, and the country will need to import these fuels in the coming years. The situation in the nuclear power sector was also fraught with difficulties with a major effort still needed to ensure safety at the Chernobyl nuclear reactor (Laptev, 2002).

Uzbekistan

In 2001, the mineral industry of Uzbekistan played an important role in the country's economy. It accounted for more than 29% of the total volume of industrial output, employed more than 8% of the industrial workforce, and contained more than 14% of the country's capital stock. Shortly after independence in 1991, the Government began to develop the oil and gas industries, the energy industry, and the nonferrous metals, chemical, and machine manufacturing industries. These industries produced more than 70% of the country's industrial output (Alimkhodzhayev, 2001).

Between 1991 and 1999, the volume of oil extraction, which included condensates, grew by more than 2.8 times, and the volume of gas extracted grew by more than 25%. As a result, Uzbekistan became energy independent and a gas exporter to Kazakhstan, Kyrgyzstan, and Tajikistan. Owing to the breakdown in the economies of the countries of the FSU and the economic ties among these countries, however, domestic demand for its metals, such as copper, molybdenum, tungsten, and zinc, decreased; consequently, production decreased (Alimkhodzhayev, 2001).

The country identified more than 2,800 deposits with more than 100 types of mineral raw materials, 65 of which were being used in industry and agriculture. Among the largest of the deposits are those for nonferrous metals, precious metals, fuels, and many types of industrial minerals. More than 100 deposits underwent detailed exploration, the majority of which are located in mountainous regions. These included 51 deposits for precious metals; 41 for nonferrous, rare, and radioactive metals; 7 for fluorspar; and 4 for ferrous metals. Uzbekistan reportedly ranked among the leading 5 countries of the world in what it termed its confirmed reserves of gold and uranium and among the 10 leading countries of the world in the extraction of gold and uranium. It reportedly occupied the number two spot in the world in the quantity of its potential gold resources. Within the CIS, Uzbekistan was the second leading gold producer and the third leading copper and silver producer (Alimkhodzhayev, 2001; Rakhimov and Alimkhodzhayev, 2001; Akhmedov, 2002).

Deposits that were developed included copper, feldspar, fluorspar, gold, lead, lithium, phosphates, potash, silver, and zinc. The majority of the explored deposits are suited for open pit development and simple beneficiation technologies, thus making it possible to extract a large percentage of the useful components of the ore. Among the most notable deposits that were developed were the Muruntau gold deposits; the Dalneye, Kal'makyr, and Sary-Cheku copper porphyry deposits; the Shavasay rare-metals deposit with cesium, lithium, and rubidium; and the Ingichke and Llyangar tungsten deposits (Alimkhodzhayev, 2001; Rakhimov and Alimkhodzhayev, 2001; Akhmedov, 2002).

Uzbekistan reportedly was fourth in the world in the quantity of its gold reserves and ninth in the world in its level of gold extraction (Akhmedov, 2002). The country discovered 48 gold deposits, which included 39 gold-bearing deposits and 9 complex deposits that contain gold. Among the largest deposits is the Muruntau gold deposit located in the Kyzyl Kum region. There are more than 10 other gold deposits under study in the Kyzyl Kum region, which included the Adzhibugut, Balpantau, Bulutkan, Daugiztau, and Tsurbay. The gold deposits in the Kyzyl Kum are in desert and hilly terrain. They reportedly have a relatively high gold content and are suited for open pit development. Mines developed at these deposits would have access to infrastructure, which would include energy, transport, and water. Uzbekistan also has a number of gold deposits located in its mountainous regions; those in western Uzbekistan, however, were not near existing infrastructure. These western deposits form the core base for the Uzalmazzolota association. In the eastern part of the country, some gold was being mined by using adits and shafts (Alimkhodzhayev, 2001; Rakhimov and Alimkhodzhayev, 2001; Akhmedov, 2002).

The country has several explored silver reserves. The Kosmanachi, Okzhetpies, and Vysokovoltnoye gold-silver deposits in Namanganskaya Oblast have been prepared for development. Large silver reserves are associated with complex copper porphyry reserves from deposits in the Almalyk mining region (Akhmedov, 2002).

The country's main copper reserves are in the ores of the Almalyk region, which also contain large reserves of gold, molybdenum, rhenium, selenium, silver, sulfur, and tellurium. These other ore constituents compose more than 40% of the value of the ore (Akhmedov, 2002).

Uzbekistan has six explored tungsten deposits with large resources. Because of their low tungsten content and complex geologic and mining setting, however, they were not under development. In 2001, exploration of the new Sautbayi tungsten deposit in the Kyzyl Kum was completed, according to the reserve classification system used in Uzbekistan industrial reserves of tungsten had a tungsten trioxide content of 0.49%. According to a technical-economic assessment, mining the deposit could be profitable and could supply raw material to the Uzbekistan refractory and hard metals plant (Akhmedov, 2002).

Uzbekistan had a leading role in the world in the production of uranium. Since 1996, uranium extraction increased, but the growth in reserves lagged behind the growth in output. Reserves prepared for development were sufficient for an additional 15 years; what are termed in Uzbekistan "prognosticated resources" could extend this period to 20 years (Akhmedov, 2002).

Because Uzbekistan lacks domestic iron ore production, the Uzbek metallurgical complex used secondary materials. The State Geological Committee (Goskomgeologiya) evaluated the first-stage sectors of the Syurenata deposit for development of iron ore in Tashkentskaya Oblast. The reserves were evaluated to be 16 Mt of iron ore that contains 5.4 Mt of iron with an iron content of 34%. Development of these reserves would enable the Uzbek metallurgical complex to expand steel production (Akhmedov, 2002).

In 1999, evaluations of new sectors of the Dautashskoye manganese deposit in Kashkadarynskaya Oblast began, and a joint venture was organized to develop these resources. The joint venture planned to mine 40,000 t/yr of ore from which 15,000 t/yr of commercial-grade concentrate could be produced. This quantity of concentrate would satisfy the demand for manganese by the country's manganese-consuming enterprises and leave some manganese concentrate for export (Akhmedov, 2002).

The country was exploring for diamonds with the assistance of Australian geologists and completed evaluations of the Karashokho and Koksay sectors in the Navoi District, which were deemed to have significant prognosticated resources. Diamond of 0.2 to 0.4 carats that could be used in industrial and jewelry applications was discovered (Akhmedov, 2002).

In the central Kyzyl Kum, the reserves of the Dzheroy-Sardara Moroccan-type phosphate deposit were estimated to be 57.7 Mt of phosphate anhydride that were prepared for development. Construction of the Kyzyl Kum phosphate complex was completed, and commercial development began. Phosphate will be processed at the Almalyk and the Samarkand chemical plants. To enlarge the Kyzyl Kum complex's reserve base, exploration of the nearby Karaktata and Severnyy Dzhetymatau deposits was being conducted (Akhmedov, 2002).

Uzbekistan also has a raw material base for the production of potash fertilizers at the Tyubegatanskoye deposit in southern Uzbekistan; the deposit has what are termed in Uzbekistan's reserve classification system "explored reserves" of 200 Mt of raw salts with a potassium chloride content of 36.8% (Akhmedov, 2002).

Raw material from the Suppatashskoye fluorspar deposit in Namaganskaya Oblast, which has reserves of 5.147 Mt, is suitable not only for the production of traditional concentrates, but also for the production of high-purity welding electrodes for specially designated uses (Akhmedov, 2002).

Resources of the Taskazganskoye graphite deposit in Navoiyskaya Oblast can serve as a raw material base for production of a number of products for use in aviation, electronics, and other uses (Akhmedov, 2002).

Scientific studies were conducted to find a raw material base for the agrochemical industry. In the southern part of the country, the Arabdasht and Khaydag bentonite deposits, which have reserves of 20.6 Mt, were being prepared for development. Use of bentonite will increase the cotton yield while decreasing the need for traditional fertilizers, improving the irrigation of the soil, and conserving moisture. In the republic of Karakalpakastan, glauconite resources were assessed to be 21 Mt. Studies were being conducted of small phosphate deposits from which material could be directly applied for local use without beneficiation (Akhmedov, 2002).

A raw material base for thermal insulating materials has been established. Explored vermiculite reserves of the western sector of the Tebinbulakskoye deposit were assessed to contain 173,000 t and will enable the production of 25,000 square meters per year of expanded vermiculite for a 25-year period (Akhmedov, 2002).

The country annually imported more than 20 types of mineral products. The State Geological Committee put forth a program to develop local deposits to produce 20 types of mineral products, 15 of which (for example, barite, caustic soda, potash, and refractory materials) will entirely end the country's dependence on imports (Akhmedov, 2002).

Two of the country's largest enterprises were the Navoi mining and metallurgical complex, which produced gold and uranium, and the Almalyk mining and metallurgical complex, which produced copper, lead, zinc, and byproduct metals. The majority of mineral production enterprises were joint-stock companies in which the Government owned a percentage of the stock (Alimkhodzhayev, 2001).

The country was trying to attract foreign investment, particularly to develop nonferrous metals (aluminum, molybdenum, tungsten trioxide, zinc, and others) and precious metals (gold). Tenders, which specify the terms for investment, were the most common form of offerings to foreign investors to participate in the reconstruction of existing projects and construction of new projects. The Zarafshan joint venture with Newmont Mining Corp. of the United States to extract gold by using heap leaching from tailings piles at the Navoi complex that mines the Muruntau deposit was cited as an example of highly successful cooperation with foreign investors. Oxus Resources Corp. from the United Kingdom was participating in a joint venture to extract gold in the central Kyzyl Kum region within the framework of the Amantaytau Goldfields joint venture; the joint venture was completing a feasibility assessment that recommended underground development of sulfide ore deposits. Since 1994, the Zarispark joint venture has been in operation to produce high-quality-jewelry. The state-owned Navoi gold mining complex owned an interest in this joint venture, which mined and processed the gold from which the jewelry was produced (Alimkhodzhayev, 2001).

Near the city of Angren in Tashkent Oblast, which was an area with highly developed infrastructure, the Kyzylalmasay and Kochubulak gold deposits were explored. Discussions were underway between the Uzbek State Committee for Geology and Uzalmazzoloto from Uzbekistan and foreign firms, which included Newmont Mining and Mitsui & Co., Ltd. from Japan; these firms could form a consortium for a joint venture.

The stock company Ugol' [Coal] was cooperating with the German firm Kuhlenkampff & Konitzky GmbH to produce and sell beneficiated kaolin from the Angren coal deposit. Also a large effort was being planned to reconstruct and develop enterprises to produce nitrogenous fertilizers by relying mainly on attracting foreign investment (Alimkhodzhayev, 2001).

Commodity Review

Metals

Aluminum.—*Azerbaijan.*—Following the collapse of the Soviet Union, aluminum production in Azerbaijan went into decline. In 1996, the Government transferred Aluminum Production Association (PO) Glinozem in Ganca to outside management by the British company Trans World Metals, Ltd.; Glinozem, which was an alumina refinery, was one of the industry's main enterprises and the only plant in the world that processed alunite as a raw material to produce alumina. Almost 2 years later, Trans World abandoned the production association because the company thought that alumina production in Azerbaijan was unprofitable (Velizde, 2000). Besides alunite, the Glinozem refinery also processed bauxite.

Stock Company (AO) Azerbaydzhanskiy Alyuminiy (Azeral) was created in April 2000 from Zaylik Aluminum Combine, Ganca PO Glinozem, and the Sumqayit Nonferrous Metals Plant. The alunite production division, which was a part of Azeral, produced alumina from alunite and was capable of producing more than 500,000 t/yr of alunite; it was idle in 1999 (Buryantseva, 2000).

In 2001, Azerbaijan's alumina production decreased by 56.4% compared with that of 2000 (Interfax Mining and Metals Report, 2002i). In 2000, the alumina plant produced only 77,000 t of alumina, and production at this plant was to be increased eventually to 450,000 t/yr. The aluminum plant had the capacity to produce only 55,000 t of primary aluminum, and accordingly, its capacity was to be increased to between 100,000 and 150,000 t/yr (Buryantseva, 2000).

In October 2000, the Azerbaijan Ministry of State Property officially announced the results of the tender for the right to mange Azeral for 25 years. The winner was the Dutch company Fondel Metal Participations BV. The company offered $1 billion and committed to pay about $300 million in the first 3 years (Butrin, 2000).

Kazakhstan.—The company Aluminum Kazakhstan in Pavlodar, which produced alumina, but not aluminum, produced 1.22 Mt of alumina in 2001 compared with 1.21 Mt in 2000. The company set a record high target of producing 1.4 Mt in 2002. Aluminum Kazakhstan comprised the Pavlodar Aluminum Plant, which produced alumina; the Krasnooktyabrskiy and Torgayskiy bauxite mines; the Keretegas lime mine; and a power and heat plant. Kazakhstan's Government owned 31.64% of the company, and unspecified legal entities and some private shareholders, the remainder (Interfax Mining and Metals Report, 2002d).

Russia.—Russia was the world's second largest aluminum producer after the United States. Its industry included 11 aluminum smelters and 5 alumina refineries. The industry was controlled by two major holding companies, Russian Aluminum Company (RUSAL) and Siberian-Urals Aluminum Company (SUAL). RUSAL was the second largest aluminum company in the world in production of aluminum after Alcoa Inc. of the United States and was owned equally by shareholders of the Siberian Aluminum Group and the shareholders of the Russian oil company Sibneft (Plunkert, 2000; Interfax Mining and Metals Report, 2002aa).

In addition to being the second largest producer of primary aluminum and alloys in the world with 10% of global production, RUSAL was the largest producer in Russia with 70% of the nation's output. Its operations encompassed the complete cycle of aluminum production from bauxite mining to primary and fabricated aluminum production and the sale of aluminum products. RUSAL exported about 2 Mt/yr of primary aluminum and aluminum alloys, and total annual revenues exceeded $4 billion. Headquartered in Moscow, Russia, RUSAL's plant and facilities were located throughout Russia and the CIS; it also owned and operated facilities in Guinea and Romania. With more than 73,000 employees, RUSAL was one of Russia's largest employers (Russian Aluminum Company, 2002§).

SUAL controlled 20% of Russia's primary aluminum production capacity and 40% of its alumina production capacity; it included the Bogoslovskiy, Irkutsk, Kandalasha, and Urals smelters and the Severural, South Urals, and Timan bauxite mines. SUAL had the capacity to produce 1.2 Mt/yr of alumina and 600,000 t/yr of aluminum (Interfax Mining and Metals Report, 2000c).

Russia had only two aluminum can manufacturers—Rostar, which was part of RUSAL, and a plant in Narofominsk, which was part of Rexam Plc. of the United Kingdom (Rexam Plc, 2003§). Can-Pack Company from Poland was planning to build an aluminum can plant in the Leningrad region; construction was scheduled to begin in 2002 and to be completed in 2003. The plant would be completed in two stages and would have the capacity to produce 1.6 million cans per year (Interfax Mining and Metals Report, 2002g).

In 2001, Russian aluminum production increased by 2.1%, and all the major aluminum smelters increased production; some were expanding capacity (Interfax Mining and Metals Report, 2002j). Russian alumina production also increased in 2001 by 6.7% (Interfax Mining and Metals Report, 2002i).

The aluminum industry consumed about 10% of the country's total electricity consumption, and large aluminum smelters were developed in conjunction with major hydroelectric powerplants in Siberia. About 85% of the country's bauxite and 65% of its alumina were produced in the Urals. Problems existed with the industry's inadequate raw material base and with the need to modernize the plants, particularly in the area of energy-saving technologies. Russia produced about 40% of the alumina it required. Almost all aluminum produced in the country was exported. Bratsk was Russia's largest smelter followed by Krasnoyarsk; these two smelters had more than double the capacity of the country's other major smelters (Interfax Mining and Metals Report, 2000c).

In 2001, RUSAL produced almost 2.5 Mt of primary aluminum and alloys, which was 1.8% more than the 2.4 Mt it produced in 2000. RUSAL's alumina production increased by 12.9% to more than 2.2 Mt compared with almost 2.0 Mt in 2000. Its output of foil decreased by 1.6% to 29,849 t compared with 30,332 t in 2000 (Interfax Mining and Metals Report, 2002aa). RUSAL also produced more than 721.8 million aluminum cans, which was a 67.1% increase compared with the almost 431.8 million cans in 2000; this included almost 639.7 million beverage cans compared with almost 362.6 million beverage cans in 2000 (Interfax Mining and Metals Report, 2002aa).

In 2001, RUSAL exported nearly 82% of its output and planned to export nearly 83% in 2002. The United States consumed nearly 11% of the company's exports; Southeast Asian countries, 32%; and European countries, the remainder (Interfax Mining and Metals Report, 2002aa).

In 2001, the number of global traders RUSAL used to sell aluminum on the world market decreased from seven to two. RUSAL was planning to undertake efforts to set up its own trading infrastructure (Interfax Mining and Metals Report, 2002aa).

Tajikistan.—The Tajik aluminum plant (TadAz) in Tursunzade produced 289,000 t of aluminum in 2001 and exported 287,000 t of aluminum valued at $398 million, which accounted for 55% of Tajikistan's exports. TadAz had a capacity to produce 517,000 t/yr if all 12 pot lines and 3 prebaked anode lines were in operation. The maximum output from TadAz was 460,000 t in 1989. When the Rogun hydroelectric powerplant, which will have the capacity to produce 3.6 billion kilowatthours per year (GkWh/yr), is commissioned, TadAz can produce at capacity, and Tajikistan's electric-power-generating capacity will rise to 13.3 GkWh/yr. TadAz was supplied with alumina from Azerbaijan, Russia, and Ukraine (Interfax Mining and Metals Report, 2002as).

Antimony.—***Kyrgyzstan.***—Reserves of antimony ore in Kyrgyzstan at the Abshir, Kadamzhay, Kassan, Khaydarkan, Novoye, Severnyy Aktash, and Tereksay deposits totaled 16 Mt of ore that contained about 270,000 t of antimony. The Kadamzhay antimony mining and processing complex extracted these ores and processed some concentrate imported from Kazakhstan and Sakha Yakutia in Russia. Kadamzhay had two mines, the Kadamzhayskiy and Tereksayskiy, with beneficiation plants that had design capacities of 200,000 t/yr and 60,000 t/yr, respectively, and metallurgical facilities in the village of Kadmzhay that had the capacity to produce 28,000 t/yr of metallic antimony and its compounds. In 1990, Kadamzhay produced 17,608 t of metallic antimony, but in recent years, it was producing about 1,200 t/yr of metallic antimony and its compounds. It sold its output to Kazakhstan, Russia, Ukraine, the United Kingdom, Uzbekistan, Venezuela, and other countries. The raw material base for the Kadamzhay Mine is the Kadamzhay and Northern Aktash deposits that had reserves of 6.3 Mt of ore that contained 95,000 t of antimony. Reserves at the Kadamzhay Mine were sufficient for 15 years (Kudayabergenov and Stavinskiy, 2001).

The raw material base for the Tereksayskiy Mine is the Tereksay and Kassan deposits that had more than 1.1 Mt and 768,000 t of ore, respectively. Although the ores from Kassan contained 40,000 t of antimony, they are not processed because of their high arsenic content; technology was lacking to eliminate the arsenic safely. Reserves were sufficient to supply the Tereksayskiy Mine for an additional 8 years. If technology were available for processing oxide ores and arsenic-bearing ores, then it would prolong the life of the mine to 20 years. Plans called for developing a group of gold-antimony deposits in the vicinity of the Tereksayskiy Mine; these deposits have total reserves of between 100,000 and 120,000 t of antimony that grades from 1% to 5% antimony and that contains 40 t of byproduct gold in ore that grades from 1 to 6 g/t gold (Kudayabergenov and Stavinskiy, 2001).

Tajikistan.—The Dzhikrutskoye antimony-mercury deposit had been developed for the Anzob mining and beneficiation plant (GOK), which, in 2001, had the capacity to mine and process 350,000 t/yr of ore. The mine at Dzhikrutskoye had reserves adequate for an additional 15 years of production. Deeper levels of the deposit were being explored to add to the reserve base, which enabled the complex to project the expansion of its capacity to 700,000 t/yr for 15 years. The Skal'noye deposit, which was discovered in the area of the complex, could serve as an additional reserve base for Anzob or become a separate development. The additional reserves at greater depths at the Dzhikrutskoye deposit and the reserves of the Skal'noye deposit were also characterized by high contents of gold, thallium, and other elements; the antimony reserves from these deposits could make Tajikistan one of the leading sources of antimony in the FSU and could enable the country to become one of the leading producers of this metal in the FSU. The Anzob GOK was supplying its antimony and mercury concentrates to metallurgical enterprises in Kyrgyzstan, but Tajikistan had begun organizing production of metallic antimony and extracting byproduct gold, mercury, and other elements (Orifov and Dzhanobilov, 2001).

Beryllium.—***Kazakhstan.***—According to an agency of the Kazakhstan Stock Exchange, the Ul'ba metallurgical plant, which was part of Kazakhstan's national nuclear corporation Kazatomprom, produced 23% of the world's beryllium metal in alloys. The Ul'ba plant operated on imported beryllium ore. In 2001, the Ul'ba plant produced 737 t of beryllium products, which was 71% more than that of 2000. Ul'ba was one of the only plants in the world that produced beryllium metal. Ul'ba was experiencing sustained growth owing to a long-term contract signed with Brush Wellman Inc. of the United States in September 2000. On the basis of long-term supply contracts and the company's stockpiles, the Ul'ba plant had enough raw materials to maintain production for 20 years (Interfax Mining and Metals, 2002q).

Chromium.—***Kazakhstan.***—The Donskoy GOK near Chromtau in the Kempirsay region in the southern Urals was the world's second largest chromite producer. The complex reportedly had about 158 Mt of ore reserves of chromite with an average chromic oxide (Cr_2O_3) content of 50.3% and the capacity to produce about 5 Mt/yr of chromite (Ellmies, 2001, appendix 2).

The Donskoy GOK was part of the Kazakhchrom holding company, which included the Aksu and Aktyubinsk ferroalloys plants and the Kazakhmarganets manganese mining firm. Kazakchrom employed about 15,000 workers. About one-half of the chromite produced was exported, and the other one-half was used domestically for ferroalloy production and other uses. The Aktyubinsk and Aksu ferroalloy plants had the capacity to produce about 300,000 t/yr and 200,000 t/yr, respectively, of ferrochrome. Most of the ferrochrome was exported, and some was consumed domestically at the Ispat Karmet steel mill (Ellmies, 2001, p. 35-36).

In the next 10 years, the complex will have switched entirely to underground mining. The Donskoy GOK commissioned Stage 1 of the Ten Years of Independence Mine, which will become the world's largest chromite mine. This underground mine will initially produce 2 Mt/yr of ore; projected capacity was 4 Mt/yr. The mine reportedly had reserves adequate for a century of production, and the ore grades 50% Cr_2O_3 (Interfax Central Asia and Caucasus Business Report, 2001a§).

Copper.—***Armenia.***—In 2001, Armenia produced 16,800 t of copper concentrate, which was 20% more than the 14,000 t it produced in 2000. The production of copper in concentrate increased by 34.1% in 2001 compared with that of 2000; nearly all mines increased production in 2001. Most of the concentrates were exported. The biggest producer, Zangezur Copper and Molybdenum Combine, raised output by 12% year-on-year in terms of value (Interfax Central Asia and Caucasus Business Report, 2002b§; Yerevan Arminform, 2002§).

Kazakhstan.—Corporation Kazakhmys Open Joint-Stock Company (OJSC) was the only company in Kazakhstan engaged in the extraction, processing, and production of copper. The main product of the company was cathode copper, which corresponded to world standards and was confirmed by certificates issued by the Zhezkazgan branch of Natseck OJSC of the state certification system of Kazakhstan (certificates dated April 20, 2001, KSS #0003913). It was among the world's 10 major copper companies (Kazakhstan Stock Exchange, 2002§).

Enterprises of Corporation Kazakhmys OJSC were located in the central and eastern regions of Kazakhstan. The majority were located in Satpayev and Zhezkazgan. Offices that represented the corporation were in Almaty and Astana (Kazakhstan Stock Exchange, 2002§).

Corporation Kazakhmys OJSC was engaged in a complete production cycle from the extraction to the production of finished goods. The corporation produced copper and zinc concentrates, cathode copper, wire rods, precious metals, sulfuric acid, and coal and generated electricity and heat. From 1995 to 2000, production and processing of ores increased by 2.6 to 2.8 times (Kazakhstan Stock Exchange, 2002§). In 2001, production of blister copper reached 407,000 t, and refined copper, 395,000 t (Yun, 2002).

Corporation Kazakhmys OJSC was founded in 1992 from the research and production enterprise Zhezkazgancvetmet OJSC, the Zhezkazgan Territorial Committee on State Property, and employees of the Zhezkazgancvetmet mining and metallurgical enterprise. By the first half of 1995, the company was on the verge of bankruptcy. In 1997, Zhezkazgancvetmet OJSC had been renamed Corporation Kazakhmys OJSC (Kazakhstan Stock Exchange, 2002§).

On June 12, 1995, 80% of the shares owned by the Zhezkazgan Territorial Committee on State Property were presented to SAMSUNG of the Republic of Korea to manage Corporation Kazakhmys OJSC. In May 1996, Deutschland GmbH (the manager of Samsung Deutschland GmbH) won a tender to obtain 40% of Corporation Kazakhmys OJSC's shares. According to management contracts concluded in June 1995 and May 1996, Samsung Deutschland had the right to manage the company and the block of shares owned by the Government of Kazakhstan. Samsung Deutschland began a program of stabilization intended to increase production and to settle previously accumulated debts to the budget, the employees (wages), and the suppliers of electricity (Kazakhstan Stock Exchange, 2002§).

From 1995 to 1997, Corporation Kazakhmys OJSC's mining enterprises and beneficiation plants were reequipped with equipment that was more productive. The copper smelter was overhauled, and obsolete equipment was replaced. Construction of the Annenskiy Mine, which had been underway for 20 years, was completed. Commissioning the first stage of the mine increased ore production by 2 Mt/yr. At the beginning of 1997, ownership of the Balkhash mining and metallurgical complex (GMK), which employed 10,390 workers and produced more than 110,000 t/yr of cathode copper, was acquired by Corporation Kazakhmys OJSC, which then acquired control of the joint-stock company Zheskent GMK, which employed more than 3,500 employees and produced more than 50,000 t/yr of copper concentrate and 25,000 t/yr of zinc concentrate. It also acquired the joint-stock company East Kazakhstan copper-chemical complex, which employed more than 3,400 workers and produced 25,000 t/yr of copper concentrate and 50,000 t/yr of zinc concentrate. To ensure a stable energy supply, Corporation Kazakhmys OJSC bought the Zhezkazgan heat and power plant and acquired the right to manage the coal mines of the joint-stock company Borly, which employed more than 3,300 workers and produced from 5.1 to 5.5 Mt/yr of coal (Kazakhstan Stock Exchange, 2002§).

Corporation Kazakhmys OJSC was transformed into a vertically integrated enterprise with its own coal mining, electricity generation, and metal ore mining, beneficiation, smelting, and refining capacities. The company's plans included further increasing production of cathode copper, expanding the ore base by developing the Zhilandy deposit and new mines at the Zhezkazgan deposit, increasing the manufacture of copper wire rod, introducing new types of copper products, increasing production of gold and silver in bullion and granules, mastering new resource-saving and ecologically beneficial technologies, renovating equipment at beneficiation and metallurgical plants, and implementing measures on environmental protection (Kazakhstan Stock Exchange, 2002§).

Corporation Kazakhmys OJSC had a host of subsidiary enterprises that provided a variety of functions that included exploration, insurance, and research. On January 1, 2001, the portion of these subsidiary companies totaled 1.8% of the assets of Corporation Kazakhmys OJSC (Kazakhstan Stock Exchange, 2002§).

Corporation Kazakhmys OJSC's production used solely its own raw material base from which it extracted more than 37 Mt/yr of ore. Corporation Kazakhmys OJSC had licenses to develop 23 sites with coal, construction materials, and copper and polymetallic ores. For copper, these sites in central Kazakhstan include what are described by Corporation Kazakhmys OJSC as the Jalimambet and Kounrad deposits, the very large Zhezkazgan copper ore deposit, the large Zhilandy group of sites, and the small Sayak-1 and Tastau deposits; in southern Kazakhstan, the Shatyrkol' copper-molybdenum deposit; and in eastern Kazakhstan, the Artemovskoye and Belousovskoye-Irtyshskoe deposits, the large Orlovskoye ore deposit for polymetallic ores and the small Nikolayevskoe, Shemonaikhinkoe, and Yubileynoye-Snigirikhaskoe ore deposits (Kazakhstan Stock Exchange, 2002§).

In the past 5 years, the following projects were put into operation by Corporation Kazakhmys OJSC for copper ore extraction: the Annenskiy Mine (4 Mt/yr), the Itauz open pit at the Zhilandy site (2 Mt/yr), and the 73/75 Mine (2 Mt/yr). A gold and silver refinery and the Shatyrkol' mine were commissioned in 2000 (Kazakhstan Stock Exchange, 2002§).

The following companies purchased and traded production from Corporation Kazakhmys OJSC: Samsung Deutschland, copper; Glencore International AG (30%), Dantrade AG (25%), Kazzinc OJSC (25%), and other firms (20%), zinc concentrate; Alashankou Yanger Co. Ltd. (46%), Ichen Co. Ltd. (47%), and Alashankou Santaim Co. Ltd. (7%), copper wire rods (Kazakhstan Stock Exchange, 2002§).

Because Kazakhstan had no major consumers of copper, zinc concentrate, and other products, Corporation Kazakhmys OJSC focused on export markets. Thus, 100% of cathode copper, 99.9% of copper wire rods, and 80% of zinc concentrate were exported. The company had a steady demand for its output on export markets, which included non-CIS countries. Major consumers of cathode copper were Europe except Greece, 39%; Turkey, 22%; Greece, 14%; Saudi Arabia, 13%; China, 7%; and the Republic of Korea, 6%. [The cited source's percentages for cathode copper consumption add to 101%, but based on information available, this discrepancy cannot be reconciled.] The major consumers of precious metals were the Kazakhstan banks, Marc Rich of Switzerland, and SAMSUNG (Kazakhstan Stock Exchange, 2002§).

Russia.—According to a statement made by the Russian delegation to the International Copper Study Group in 1998, Russia possessed about 10% of the world's copper reserves, although estimates by the U.S. Geological Survey (USGS) placed the reserves at closer to 5% of the world's total (International Copper Study Group, 1998; Edelstein, 2003). The majority of its reserves are in copper-nickel sulfide ores at the Noril'sk complex in East Siberia and pyritic copper sulfide ores in the Urals. More than 50% of the reserves are in deposits under development or in production. Ore grades were reportedly competitive with other producing deposits in the world (Kozlovskiy and Shchadov, 1999; Novikov and Yastrzhembskiy, 1999). Approximately 70% of the country's reserves are in East Siberia; 20%, in the Urals; and 10%, in the North Caucasus (Haeusser and others, 1994, p. 124). From 65% to 70% of ore mined was from copper-nickel sulfide deposits, and the remainder, from pyrite ores.

In 2001, Russia ranked seventh in the world in mine output of copper (Edelstein, 2001). Noril'sk Nickel Mining and Metallurgical Company [OJSC MMC Noril'sk Nickel (Noril'sk)], which was the country's major copper mining enterprise, produced more than 70% of the country's copper and was mining copper-nickel sulfide ore with an average copper content of about 5%. The remainder of the country's copper was produced at mining and metallurgical enterprises in the Urals region. Mining enterprises in the Urals, however, were able to supply only somewhat less than 50% of the ore requirements of the copper-producing metallurgical plants in the Urals (Kozitsyn, 2001).

Noril'sk planned to increase its copper production at its Polar Division in East Siberia. At the Polar Division, the Oktyabr'skiy underground mine was producing almost 70% of Noril'sk's copper mine output. Most of the remaining copper ore produced by the Polar Division came from the Komsomol'skiy and Taymyrskiy underground mines (Piven' and others, 1996). To maintain and increase levels of platinum-group metal (PGM) production, which was a major product of the company, Noril'sk planned to increase output of cuprous ore from the Oktyabr'skiy Mine to compensate for the fall in extraction of rich high-nickel-content ores, which were being depleted. Plans called for increasing cuprous ore production at Oktyabr'skiy to 1.6 Mt/yr in 2002 from 100,000 t/yr in 1999. During this same period, production of rich copper-nickel ores was to decrease to 3.4 Mt/yr from 4 Mt/yr (Piven' and others, 1999). Because the cuprous ores at Noril'sk are more than 40% higher in copper content than the nickel-rich ores, this should result in a significant increase in copper production (Natural Resources Canada, unpub. data, 1999). Also, Noril'sk was planning to develop cuprous ores at other mines as alternatives to nickel-rich ores that were being depleted.

Unlike ores mined by Noril'sk, ores mined in the Caucasus and Urals regions were from copper and copper-zinc deposits and not as economically competitive with other deposits in the world. These ores have lower copper grades than those from Noril'sk, and although these copper ores in the Urals are complex ores that contain cadmium, copper, gold, silver, zinc, and other metals, the total value of ore constituents was lower than that of Noril'sk ores. The zinc content of these ores in the largest developed deposits did not exceed 1.8%, and the copper content, 1.0%. Furthermore, many of these deposits were almost depleted (Novikov and Sazonov, 2000).

Most of the copper-producing enterprises in the Urals were consolidated into the Urals GMK. In 2000, the Urals GMK represented 21 metallurgical, mining, and other enterprises in the Urals region (Interfax Mining and Metals Report, 2002ax).

In the Urals, growth in reserves in the near term would be in areas contiguous to and beneath existing reserves. Underground mines were being developed beneath the Molodezhnyy, Sibay, and Uchaly open pits in the Urals because of the depletion of reserves suitable for open pit development. Also in the Urals, copper mines were being developed at the Aleksandrinskoye deposit, which was part of the Mednogorsk complex; the Letneye deposit to supply the Gai complex; and the Safyanovoskoye deposit (Kozlovskiy and Shchadov, 1999; Novikov and Yastrzhembskiy, 1999).

The Urals GMK made plans to invest $400 million to develop the large Udokan copper deposit in Chita Oblast in the Transbaikal area of Siberia. The 6-year project called for developing a mining capacity of 10 Mt/yr to produce between 130,000 and 150,000 t/yr of copper concentrate. Udokan reportedly had reserves of 20 Mt of copper in ore that averaged 1.5% copper. About 70% of the reserves can be open pit mined. The Russian Ministry of Natural Resources was planning to call for a tender for development rights to Udokan in which a major bidder was expected to be Corporation Kazakhmys OJSC (Interfax Mining and Metals Report, 2002ax).

The country was slow in incorporating secondary materials in the production process. Production of copper from scrap and wastes increased to more than 100,000 t in 2000. Officially, Russia reported exporting only 18,800 t of copper in scrap in 2000; this was a huge reduction from the 201,200 t that it exported in 1999. According to estimates, however, more than 115,000 t of copper in products and goods was exported for sale as secondary copper in 2000; this was not considered to be a rational use of these products (Boytenko, 2001; Smirnov, 2001).

Ferroalloys.—*Kazakhstan.*—Kazakhstan was the major producer of chromite in the CIS and also produced some manganese ore. These domestically produced raw materials were used by Kazakhstan's two major ferroalloy plants—the Aksu and Ferrokhrom, which were part of Kazakhrom. Kazakhstan's Government and Kazakhstan's Mineral Resource Corp. owned 31.1% and 28.75%, respectively, of Kazakhrom. Kazakhstan was a large producer of chromium and silicon ferroalloys and also produced some manganese ferroalloys (Europe Steel Plc, 2000§).

In 2001, Kazakhstan's production of ferroalloys increased by 3% to 1.13 Mt compared with that of 2000. Ferrosilicon production increased by 9% to 145,000 t; ferrosilicon manganese, by 37% to 141,000 t; and ferrosilicon chrome, by 43% to 79,800 t. Ferrochrome production, however, fell by 5% to 761,000 t. Production of high-carbon ferromanganese with a carbon content of more than 2% soared by 396% year-on-year to 5,300 t (Interfax Mining and Metals Report, 2002o).

Russia.—Russia lacked significant production of two of the major minerals used in ferroalloy production, chrome and manganese, which were produced mainly in Kazakhstan and Ukraine during and subsequent to the Soviet period; during the Soviet period, Georgia also had been a significant producer of manganese, but production had fallen sharply in the past decade. Russia produced mainly blast furnace ferromanganese, electric-furnace chromium and silicon ferroalloys, and ferroalloys from other metals, such as molybdenum, nickel, titanium, tungsten, and vanadium.

In 2001, Russian production of ferroalloys decreased by 7.6% compared with that of 2000. Production decreased by 28.3% to 210,600 t of 60% ferrochrome; production, however, increased by 5.2% to 707,100 t of 45% ferrosilicon. Russia's largest ferroalloys producers were the Chelyabinsk electrometallurgical enterprise and the Kuznetsk ferroalloys plant, which was a major ferrosilicon producer. The Chelyabinsk enterprise attributed the decrease in output in 2001 to a decrease in demand from Russian consumers and an increase in cheap imports from Ukraine (Interfax Mining and Metals Report, 2002am).

Ukraine.—Ukraine was the major producer of manganese in the CIS. Ferroalloy plants in Ukraine produced only manganese and silicon ferroalloys owing mainly to a lack of domestic resources of other alloying minerals. The country imported other ferroalloys. In 2001, Ukraine's ferroalloy production grew by 2% to 1.41 Mt compared with that of 2000 (Interfax Mining and Metals Report, 2002f).

The Nikopol' ferroalloy plant in Ukraine specialized in the production of silicomanganese and high-carbon ferromanganese and had begun production of medium-carbon ferromanganese. The Zaporozh'ye ferroalloy plant produced manganese ferroalloys (silicomanganese, all grades of ferromanganese, and manganese metal) and silicon ferroalloys (all grades of ferrosilicon). The basic product of the Stakhanov ferroalloy plant was ferrosilicon of all grades. Previously, about 100,000 t of blast furnace ferromanganese was produced at the Konstantinovskiy and Kramatorskiy metallurgical plants, but production at Kramatorskiy ended in 1999.

Gold.—*Armenia.*—The Ararat Gold Recovery Company joint venture (AGRC) was set up in July 1998 to mine the Meghradzor and Zod gold lodes and to recycle the tailings at the recovery plant. In 2001, Armenia's Government signed 50% of the shares in AGRC to Canada's First Dynasty Mines Ltd., which made it the sole foreign partner of the joint venture. The joint venture had a 20-year license to mine the two lode fields and will invest to develop the lodes and recover gold from tailings at the Ararat gold recovery plant. The joint venture also had the exclusive right to conduct geological exploration within a radius of 20 km of the Meghradzor and Zod deposits (Interfax Mining and Metals Report, 2002f).

In 2001, 30,000 t of ore was mined at Meghradzor. By 2006, 2.6 t/yr of gold will be produced from 534,000 t of ore at a grade of 5.6 g/t gold with a recovery rate of 90% (Interfax Mining and Metals Report, 2002f).

During the next 7 years, the Zod lode was expected to yield 8.7 t of gold from 2.058 Mt of mined ore at a grade of 5.9 g/t gold with a recovery rate of 72%. Gold production was projected to increase to 1.8 t/yr recovered from 500,000 t of ore in 2005 from 30 kilograms per year recovered from 7,800 t of ore in 2002 (Interfax Mining and Metals Report, 2002f).

From 1998 to 2001, the Ararat joint venture recovered 3 t of gold from 6 Mt of the 12 Mt of tailings available to the Ararat recovery plant; 1.8 t of gold was recovered in 2000. The remaining 6 Mt should be processed by the end of 2003 to yield another 3 t of gold, of which 1.6 t was to be recovered in 2002 and 1.4 t in 2003 (Interfax Mining and Metals Report, 2002f).

Kyrgyzstan.—Since 1986, the Makmal gold deposit was under development and produced between 1 and 2.4 t/yr of gold. Expansion of the reserve base at Makmal was being studied, which could significantly increase gold output. The Sultan-Sary deposit has 20 t of explored gold reserves with an average gold content of 6 g/t. The deposit was producing between 300 and 500 kilograms per year of gold (Kudayabergenov and Stavinskiy, 2001).

The Kumtor deposit in Kyrgyzstan reportedly ranked 5th as the lowest cost producer of gold and 16th in the world in the size of its gold reserves (Kudayabergenov and Stavinskiy, 2001). In 2001, Kumtor's total gold reserves were estimated to be more than 250 t. The general agreement to develop the Kumtor project by the Kumtor Gold Company joint venture was signed on December 4, 1992. Kumtor Gold was owned by the Kyrgyzstan Government (two-thirds) and Canada's Cameco Corporation (one-third). Kumtor Operating Company (a wholly owned subsidiary of Cameco) was the project operator.

Kumtor Gold mined about 100 t of gold since production started in May 1997 (Interfax Mining and Metals Report, 2002s). Construction of the mill to process the gold ore was completed in December 1996, and commercial production at the mill began on May 1, 1997. The mill's production capacity was 670,000 troy ounces per year (20.8 t/yr), of which Cameco's share was approximately 220,000 ounces per year (6.8 t/yr) (Cameco Corporation, 2001§).

Kumtor Gold targeted production at 20.7 t, or 666,116 ounces, of gold in 2002, which would be less than the 23.4 t, or 752,719 ounces, of gold it produced in 2001. According to Kumtor Gold, gold production would fall mainly because of lower grade ore, which averaged 5.14 g/t gold in 2001 and could fall to 4.67 g/t in 2002. In 2001, the cost for producing an ounce of gold by Kumtor Gold was $142, which was the lowest since mine startup (Interfax Mining and Metals Report, 2002s; Cameco Corporation, 2002§).

Kumtor Gold produced about 10% of Kyrgyzstan's GDP. In 2001, the company contributed $16.5 million to the national budget in taxes and other payments (Interfax Mining and Metals Report, 2002s). The company employed almost 1,600 workers; about 90% are citizens of Kyrgyzstan (Cameco Corporation, 2002§).

The Kyrgyz Government authorized the joint-stock company Kyrgyzaltyn to represent the country in discussions with investors for creating joint ventures for gold development and for Kyrgyzaltyn to participate in such joint ventures (Kudayabergenov and Stavinskiy, 2001). The Dzher-Uy deposit was prepared for development in 1985 and was acquired in 2001 by Talas Mining Company, which was a joint venture between Kyrgyzaltyn and Norox Mining Company Ltd. (a subsidiary of Oxus Mining plc of the United Kingdom). The deposit would be developed initially by open pit to mine 650,000 t/yr of ore and then by underground methods to mine 350,000 t/yr (Kudayabergenov and Stavinskiy, 2001).

The Taldy-Bulak gold deposit was being studied for development. Its reserves were reevaluated and mining was being planned from only the richest ore from the deposit (Kudayabergenov and Stavinskiy, 2001).

Russia.—In 2000, Russia mined 152.5 t of gold, which included 11 t of byproduct gold, and recovered 1.8 t of gold from scrap. In 2001, Russian gold production reached a 10-year high with production increasing by 8.2% compared with that of 2000. A total of 639 enterprises mined gold in 2001. Lode deposits accounted for 45% of output. The country's two largest gold mining enterprises were Omolon Gold Company, which was the largest in the Magadan region, and Polius Gold Company, which was located in the Krasnoyarsk Territory. In 2002, more than 50% of Russia's gold production was projected to be from lode deposits; total mine output was projected to be more than 175 t (Interfax Mining and Metals Report, 2002ad, aj).

In 2001, the Magadan region produced 30.15 t of gold, or 2.9% more compared with that of 2000. About 325 enterprises were mining gold in the Magadan region. Reportedly, 197 producers in the region received a production quota of 44 t for 2002; this production increase was to be at existing deposits and through development of new sites. [It appears from this reporting from two different sources that either 197 producers controlled about 325 enterprises or about 128 separate enterprises did not receive production quotas.] Omolon Gold sent 13.5 t of gold to the Kolyma refinery in the same region (Interfax Mining and Metals Report, 2002t, u).

Polius Gold produced 16 t of gold in 2001, which was 10% more compared with that of 2000. The company mined the Olimpiady gold lode with reserves reported to be between 700 and 1,000 t. Olimpiady was one of Russia's largest gold deposits with ore at a grade of 8 g/t gold. Polius Gold planned to mine between 25 and 30 t/yr of gold. The 10% increase was projected because of the commissioning of the second stage of the ore mill at the Olimpiady gold lode (Interfax Mining and Metals Report, 2002y).

The Irkutsk region produced 16 t of gold in 2001 and had its 2002 quota set at 17 t. About 90 companies were engaged in gold production in the Irkutsk region; the largest one was Lenzoloto, which produced 8.4 t in 2001 (Interfax Mining and Metals Report, 2002m).

The Sakha Yakutiya Republic produced about 16 t of gold in 2001 and planned to produce 18 t in 2002. Output in 2001 was almost 1 t less than that of 2000 and was below the republic's 20 t production target for 2000 and 2001 (Interfax Mining and Metals Report, 2002bg).

Uzbekistan.—The Nawoiy Integrated Mining and Metals complex, which mined the Muruntau deposit, was one of the world's largest gold mining enterprises; more than 50 t/yr of gold was produced in 2001. The Zarafshan-Newmont joint venture was established in 1992 by Newmont Mining Corp. of the United States (50%), the Uzbek State Committee for Geology and Mineral Resources, and the Nawoiy Integrated Mining and Metals Complex of Uzbekistan. Credit was provided by international financial institutions, which included the European Bank for Reconstruction and Development (EBRD). The joint venture recovered gold from stockpiled ore at the Muruntau open pit. Zarafshan-Newmont had permission to process 220 Mt of lean ore at a grade of 1.4 g/t that had accumulated over the years at Muruntau. Work on the Zarafshan-Newmont processing facility began in October 1993 and was completed in 1995 (Interfax Mining and Metals Report, 2002bj).

The joint venture planned to process 60 Mt of ore at a grade of more than 1.6 g/t during the first 5 years of the project. During the second stage, which should last 10 years or longer, the joint venture was to process ore at a grade of 1.1 g/t. The design capacity for processing was 13.8 Mt/yr of ore (Interfax Mining and Metals Report, 2002bj).

The joint venture recovered 16.7 t in 1999 and 15.43 t in 2000. In 2001, it produced 13.048 t of gold, which was 14.5% less than that of 2000. The drop in production was attributed to the joint venture starting to process material with leaner gold content. It intended to sustain future gold production at around 13 t/yr. In 2002, the joint venture expected to produce 13.64 t (Interfax Mining and Metals Report, 2002bj).

Also in 2002, the joint venture would use the last of a credit of $30 million granted in 2001 by the EBRD to build a new leaching pad to process additional ore. The project should extend the joint venture's life until 2015 and keep gold production at projected levels (Interfax Mining and Metals Report, 2002bj).

In 2001, at the Almalyk mining and metallurgical complex in Uzbekistan, byproduct gold production increased to 13.407 t compared with 13.135 t in 2000 (Interfax Mining and Metals Report, 2002bf).

Iron and Steel.—*Russia.*—In 2001, Russia produced 58.97 Mt of crude steel, which was 0.4% more than that of 2000; 47.1 Mt of rolled steel, which was 0.8% less than that of 2000; and

44.98 Mt of pig iron (including blast furnace ferroalloys), which was 0.3% more than in 2000. Sheet accounted for 41.1% of total rolled output (Interfax Mining and Metals Report, 2002ah). With almost all of its major stainless steel producers increasing output, Russia produced 95,300 t of rolled stainless steel in 2001, which was 11.3% more than that of 2000 (Interfax Mining and Metals Report, 2002ao). With output increasing at practically all major Russian pipe mills, steel pipe output increased 8.5% in 2001 compared with that of 2000. Pipe output increased owing to increased demand from oil and gas industries. Pipe output was also stimulated by the Russian Government's decree in May that introduced protective measures against low-cost pipe imports (Interfax Mining and Metals Report, 2002aq).

Beginning in 1994, Russia and the European Union (EU) have signed general agreements on steel trade. The last one, which was signed in 1997, expired in December 2001. In early 2002, the EU and Russia agreed on terms for deliveries of Russian steel for the next 3 years. The agreement stated that, starting in 2002, the quotas for deliveries of Russian steel to the EU will be increased by 28% more than the 840,000 t Russia was entitled to ship to the EU in 2001. The quotas will then be increased by 2.5% in 2003 and 2004. If Russia was to lift its export duties on ferrous scrap metal, then the quotas would be raised another 12% or proportionately depending how much the scrap export duties are lowered. In April, Russia imposed a duty of 15% of customs value, but not less than €15 per metric ton of scrap metal exports. If Russia joined the World Trade Organization during the next 3 years, then the new agreement with the EU would cease to be valid (Interfax Mining and Metals Report, 2002ac).

In December, the United States announced the beginning of investigations of a number of countries whose steel exports may have been damaging to the U.S. economy; Russia was named among these states. In 1999, agreements between Russia and the United States already limited steel exports to the United States. The next round of Russian-United States consultations on possible limitations on Russian steel exports was to be held in Washington, DC, in February 2002. In March 2002, the United States declared that, for a 3-year period, it would impose duties that would range from 8% to 40% on a wide variety of types of imported steel from a number of countries, which included Russia (Interfax Mining and Metals Report, 2001c, 2002be).

This action by the United States could have economic consequences for the Russian steel industry and economy because the United States had accounted for 17% of Russia's steel exports. Consolidated payments from the Russian steel industry to the national budget could shrink to $20 billion in 2002 from between $50 billion and $51 billion in 2001. To maintain its domestic steel industry, Russia was pursuing imposing import duties on steel from other CIS countries, in particular Kazakhstan and Ukraine (Interfax Mining and Metals Report, 2002ap).

As part of an international effort to reduce excess steelmaking capacity, Russia agreed to join a pact reached at the Organisation for Economic Co-operation and Development (OECD) steel forum in Paris, France, and to reduce its steelmaking capacity by 10 Mt/yr by 2010. Although Russia had the capacity to produce more than 66 Mt/yr of steel, it produced only 50 Mt in 2001. The country will not necessarily decrease output because increases in domestic consumption could significantly affect its production levels (Interfax Mining and Metals Report, 2002ai).

Development of the Russian steel industry in the post-Soviet period was influenced by a number of domestic factors, most notably those that affected the machine-manufacturing industry and the investment climate. Since 1991, machine manufacturing has undergone three cycles. The first cycle, which was from 1991 to 1995, was a period of rapidly declining production; the second cycle, which was from 1996 to 1998, was a period of more slowly decreasing production and stagnation in many branches of the economy; and the third cycle, which began in 1999, was characterized by a very positive growth in production. From 1991 to 1998, the decrease in the domestic demand for steel products by the machine-manufacturing sector was more than fivefold; at the beginning of the 1990s, this had been the largest consumer of Russian steel products and had accounted for about 40% of domestic demand. The decrease in the demand for steel products in the domestic construction sector, which included industrial construction, pipeline construction, railroad construction, and the maintenance of existing industrial infrastructure, was fourfold. Since 2000, however, demand revived in practically all domestic sectors, which included agricultural machinery, armaments, infrastructure maintenance, oil and gas development and transport, and the railroad (Brodov and Makarova, 2002).

Russia, which was a major exporter of ferrous metal products, accounted for 10% of world exports. During the economic crisis of 1998, Russia was able to increase its exports significantly and thus preserve its steel industry, but this also led foreign countries to initiate dumping charges and to institute quotas and tariffs on Russian exports. Russia was also importing ferrous metals, many of which were contained in imported machinery and equipment. Ukraine was a major exporter of ferrous metals to Russia, particularly for those ferrous metals products in which Ukraine had specialized during the Soviet period (Brodov and Makarova, 2002).

Ukraine.—Ukraine had the world's seventh largest steel-producing industry in 2001, and its share of the global steel market increased to 4% in 2001 from 3.7% in 2000. In 2001, Ukraine produced 33.1 Mt of steel, which was 5.4% more than that of 2000; 29.1 Mt of all types of rolled output, which was 7% more than that of 2000; and 26.4 Mt of pig iron, which was 3% more than that of 2000. In 2001, however, pipe production fell by 4% to 1.6 Mt compared with that of 2000, and production of scrap metal fell by 8.7% to 5.3 Mt compared with that of 2000 (Interfax Mining and Metals Report, 2002ba).

Although Ukraine did not agree to reduce its steelmaking capacity at the OECD steel forum in Paris in February 2002, Ukraine, according to its National Program of Development for the Mining and Metals Sector, intended to reduce capacity for pig iron production by 5.75 Mt; for crude steel, 5.91 Mt; and for rolled products, 3.9 Mt by 2010. Steelmaking enterprises, however, did not confirm these capacity reductions. In 2001, Ukraine exported 28.7 t of steel products, which equaled 87% of its metal output. Steel exports generated 47% of Ukraine's foreign exchange revenues (Interfax Mining and Metals Report, 2002az).

Information on ownership of Ukraine's steel industry was not complete, but on the basis of available information, a single group of owners in Donets'k controlled four of the country's eight largest steel mills—Alchevs'k, Azovstal', Donets'k, and Yenakiyeveskiy—and two of the five largest pipe plants—Dnepropetrovsk and Khartsyzsk. A portion of these assets has been consolidated into the Industrial Union of Donbas (IUD). The IUD was involved in the management of Khartsyzsk, in which it directly owned a controlling stake, and also in the management of Alchevs'k, Azovstal', and Dnepropetrovsk, in which it owned a minority stake. The IUD formed business partnerships with other Donets'k-based metal market enterprises, which included Closed Joint Stock Company (CJSC) ARS, the Danko-Media group, Kontsern Energo, and Leman Ukraine Ltd. (a subsidiary of Leman Commodities S.A.), but information was not available regarding possible ownership links with these enterprises (Metal Bulletin, 2002).

Danko's main asset was the Yenakiyeveskiy steel mill with the capacity to produce 1.2 Mt/yr; Danko acquired the controlling share in 1986. Danko was also a trading company. Energo reportedly owned the Donets'k metal works, which was divided in two with the new part named CJSC MMW Istil-DMZ (a subsidiary of The International Steel & Tube Industries Ltd. of the United Kingdom, formerly part of the trading firm Metals Russia) (Metal Bulletin, 2002).

After the group from Donets'k, the most significant group of owners was the Privat Bank group from Dnepropetrovsk. Its Privat intertrading subsidiary had management control of the 1.23-Mt/yr-capacity Dnepropetrovsk steel mill and holdings in the Konstantnovskiy steel mill and the Zaporozh'ye rolling mill. Its management control of Dnepropetrovsk consisted of managing a Government-owned 42% share of the enterprise, which could be a step towards ownership. This arrangement was also used at the Dneprovskiy steel mill where the majority Government holding was managed by the Kharkiv-based Ukrsibbank (Metal Bulletin, 2002).

Ukraine's largest steelmaker Krivorozhstal was owned and operated by the Government. The pipemaking facilities were dominated by the Interpipe group, which owned the country's largest pipe producer Nizhnedneprovskiy plant and the steel pipe plant at Nikopol'. Il'ichstal Company was the majority owner of the Il'ich plant at Mariupol'. The specialty steelmaker Dneprospetsstal was owned by the Metallurgiya group, which recently sold its ferroalloy interests to Privat Bank to concentrate on developing Dneprospetsstal and its power industry interests (Metal Bulletin, 2002).

Transparency regarding ownership was just beginning. The only significant shareholdings traded on the local stock market were minority stakes in the Il'ich steel mill and the Nizhnedneprovskiy pipe plant (Metal Bulletin, 2002). Foreign ownership was becoming more common with some emigrants heading this involvement.

Midland Resources of Canada controlled the Zaporozh'ye steel mill, which was Ukraine's third largest steel producer. The venture capital group Sigma Bleyzer, whose owner lived in Texas, owned a more than 75% share in the Makeevka pipe plant (Metal Bulletin, 2002).

The steel industry was highly dependent on exports. Ukraine exported 87% of its output, which totaled 28.7 Mt of steel in 2001. Domestic steel consumption in 2001 increased to 4.4 Mt, but this was still 14% to 15% of total output. Barter as a share of sales fell to 2.7% in 2001 from 3.5% in 2000 (Interfax Mining and Metals Report, 2002ba).

A number of countries had imposed restrictions on steel imports from Ukraine. In early 2002, 3-year duties of between 8% and 30% were imposed on most steel imports into the United States from Ukraine and a number of other countries. These United States duties, it was estimated, could cost Ukraine between $63 million and $220 million per year (Interfax Mining and Metals Report, 2002bc).

Iron Ore.—***Russia.***—Russia's iron ore output in 2001 decreased by 4.8% to 82.5 Mt compared with that of 2000. Production of iron ore concentrate decreased by 4.2% to 77.7 Mt, and that of pellets by 9.2% to 27.8 Mt (Interfax Mining and Metals Report, 2002ab).

According to the Minister of Natural Resources, Russia had more than 27% of the world's reserves of iron ore (Yatskevich, 2000). In 2001, 26 iron ore deposits were under development; reserves were adequate for 15 to 20 years at the 2001 rate of extraction. These reserves average, however, about 35% iron, which is low by world standards. The ratio of overburden to ore is four times greater on average than in other countries, which greatly increases the comparative cost of iron ore extraction. Large quantities of what are termed in the Russian Reserve Classification System "explored reserves" occur in the Kursk Magnetic Anomaly (KMA). These explored reserves are potential sources of new development (Kozlovskiy and Shchadov, 1999; Novikov and Yastrzhembskiy, 1999). Explored reserves in the KMA in the Russian Reserve Classification System categories A, B, C1, and C2 reportedly total 47 Gt, of which 29 Gt was considered to be rich ores (Gornaya Entsiklopediya, 1989, p. 357).

Russia's production of commercial iron ore was centered in mining enterprises that extract finely disseminated magnetite ores. The country's beneficiation technology was not state-of-the-art, and the quality of the concentrates in iron and silica content did not often correspond with the demands of the metallurgical industry. More than 80% of concentrates were produced by wet magnetic separation. The majority of concentrates have iron contents of between 66.5% and 68.5%. The quality of the concentrates produced in Siberia was limited because of the one-stage concentration process used, and that produced in the Urals, by characteristics of the ores, which limit, for example, the quality of concentrate produced from the Kachkanar enterprise's titaniferrous magnetites to between 62.5% and 63% iron by using a three-stage system (Sukhoruchenkov and others, 2001).

The KMA territory included the Belgorod and Kursk Oblasts and parts of the Bryansk, Orlov, and Voronezh Oblasts in Russia and also part of the Khar'kov Oblast in Ukraine. Only the central part of the KMA, however, was being mined for iron ore and other minerals. Iron ore mining in the KMA began in 1952 at the Korobkovskoye deposit where iron quartzites were extracted by underground mining. Open pit mining was used by the Lebedinskiy, Mikhaylovskiy, and Stolinskiy GOKs. Underground mining started at the Yakolevskoye deposit (Kusherenko, 2001).

Ukraine.—Ukraine has about 30 Gt of explored iron ore reserves, which was more than 24% of the explored iron ore reserves in the FSU and about 15% of the world's iron ore reserves. Practically all iron ore reserve data was compiled before the dissolution of the Soviet Union in 1991 and was based on the Soviet reserve reporting system. Two-thirds of the explored reserves (more than 18 Gt) were in the Krivoy Rog Basin, with about 4.5 Gt of reserves in the Kremenchug, 3 Gt in the Azov, and 500 Mt in the Beloye Ozero iron ore districts. Ores from the Azov District were considered to be a prime target for future development owing to the fact that they would be easy to concentrate.

Iron ore mining in Ukraine was based on the extraction of magnetic quartzites and rich hematite ores. These can be processed to produce concentrates that average 65% iron for magnetic quartzites and between 56% and 61% iron for the hematite ores, which was lower than the averages for concentrates being sold on world markets.

The Krivoy Rog Basin, which was the leading iron ore-producing region, had reserves that were adequate for 6 to 16 years of development depending on the mining enterprise. Considerable resources are located beneath planned development depths at Krivoy Rog; and these resources, if placed in the reserve category, could extend the mining period of enterprises in the Krivoy Rog to an average of 30 years (Kolosov, 2001).

In 2001, Ukraine's iron ore production decreased by 1.8% to 54.65 Mt compared with that of 2000. Some enterprises showed an increase in production, and others, a decrease. Production increased by 9.9% at the Severnyy GOK, by 9.8% at the Novokrivorozhkskiy GOK, and by 5.4% at the Yuzhnyy GOK (Interfax Mining and Metals Report, 2002n).

Materials in tailings dumps from concentration totaled more than 3 Gt and included iron-rich tailings. From these tailings, production of concentrates at a grade of 65% iron was considered to be feasible. The large amount of overburden being stored could be processed. An approach was called for that was more comprehensive and used waste products to recover economic value and to reduce the environmental load (Kolosov, 2001).

Lead and Zinc.—***Kazakhstan.***—In 2001, Kazakhstan produced about 5.76 Mt of lead-zinc ore, which was more than the 5.64 Mt it produced in 2000. The country also produced 158,800 t of lead metal, which was less than the 185,800 t it produced in 2000, and 276,900 t of zinc metal, which was more than the 262,600 t it produced in 2000 (Interfax Statistical Report, 2002).

Kazakhstan had reserves of about 15 Mt of lead and 35 Mt of zinc and was one of the world's leading producers of these commodities. The deposits, which produced about 70% of the country's lead and zinc output in 2001, are in the Leninogorsk and Zyryanovsk regions of northeastern Kazakhstan; these deposits have been mined since their discovery in 1770. With the dissolution of the Soviet Union, the production of these metals rapidly declined. Production, however, was significantly restored as a result of foreign investment, particularly from Glencore AG of Switzerland. The country was still operating far below capacity. The majority of the country's lead and zinc was produced by Kazzinc, which produced 70% of Kazakhstan's zinc and 35% of its lead, and the Zhayrem GMK, which produced about 50% of the country's lead and almost 20% of its zinc. The rest of Kazakhstan's lead and zinc was produced mostly as a byproduct of copper production. Most of the lead and zinc production was exported, but some was consumed domestically at the Ispat Karmet steel works and the Taldy-Kurgan accumulator and battery plant (Ellmies, 2001, p. 43-45).

Lead-zinc ore was mined at 11 deposits; the concentrates were processed at the Chimkent, Leninogorsk, and Ust'-Kamenogorsk lead-zinc smelting enterprises and the Balkhash copper complex. Refining these lead and zinc ores also yielded bismuth, cadmium, germanium, gold, indium, silver, tellurium, and thallium. The Chimkent refinery, which had the capacity to produce 160,000 t/yr of lead, was the largest lead smelter in the FSU; it also produced about 20 t/yr of bismuth and 10 t/yr of cadmium. The Austria-Kazakhstan joint venture JV RR Kazakhstan Trade and Finance acquired the Chimkent works and invested in two new production lines. This joint venture, however, went bankrupt in 1999, and Yuzhpolimetal acquired the assets (Ellmies, 2001, p. 43-45).

Kazzinc was under the control of Switzerland's KazAstur Zinc, which has owned 62.4% since June 1997; KazAstur Zinc was a wholly owned subsidiary of Glencore. Kazzinc had the capacity to mine 5 Mt/yr of crude ore and had 26,000 employees. It comprised the following enterprises: the Leninogorsk polymetallic GMK with smelting capacity to produce 107,000 t/yr of zinc, 30,000 t/yr of lead, and cadmium, gold, silver, and other byproduct metals; the Zyryanovsk lead-zinc mining complex; the Ust'-Kamenogorsk metallurgical plant with the capacity to produce 160,000 t/yr of zinc, 145,000 t/yr of lead, and 43,000 t/yr of copper; and the Tekeli lead-zinc mining complex with the capacity to produce 30,000 t/yr of zinc in ore and 15,000 t/yr of lead in ore (Ellmies, 2001, p. 43-45).

Russia.—In 2001, Russia's production of lead in concentrate decreased by 7.2% compared with that of 2000, but production of lead metal, which included secondary lead, increased by 1.7%. Russia's production of zinc in concentrate decreased by 8.6% compared with that of 2000, but production of zinc metal increased by 3.2% (Interfax Mining and Metals, 2002an).

Russia was the second leading producer of lead and zinc in the CIS following Kazakhstan and was the main consumer of these metals in the CIS. While part of the Soviet Union, the Russian Republic had been a net importer of lead and zinc. Consumption of lead and zinc, however, fell precipitously in Russia since the breakup of the Soviet Union in 1991. Domestic mine output and metal production of lead were still less than consumption levels, but zinc consumption had fallen to a degree where mine output and metal production levels were near consumption levels (Interfax Mining and Metals Report, 2002an).

The vast majority of Russia's lead was mined in the eastern part of the country, and the vast majority of its zinc was mined in the Urals. The Far East region accounted for 62.8% of the country's lead mined and 9.2% of its lead reserves; the East Siberia region, 17.7% and 75.9%; the Urals, 12.6% and 1.8%; the West Siberia region, 4.3% and 11.1%; and the North Caucasus, 2.4% and 2%. The Urals accounted for 86.7% of the country's zinc mined and 26.5% of its reserves; the Far East region, 9.2% and 4%; the West Siberia region, 2.1% and 10.5%; and the North Caucasus, 1.8% and 2.2% (Yatskevich, 2000).

The Dalpolimetall Mining and Metals Complex (GMK Dalpolimetall), which was a lead-zinc producer in Dal'negorsk in the Russian Far East's Primor'ye Territory, produced more than 70% of Russia's lead concentrates and more than 14% of its zinc concentrates. GMK Dalpolimetall was established on September 15, 2001, in the city of Dal'negorsk with a charter capital of Rub680 million (approximately $21.5 million). AO GMK Dalpolimetall owned 51% of the shares, and ZAO Svintsovo Zavod owned the remaining 49%. Its main business was the mining of polymetallic ores of bismuth, lead, and zinc. The company exported 80% of its output (Interfax Mining and Metals Report, 2002k).

In 2001, the Chelyabinsk electrolytic zinc plant produced 155,000 t of zinc, which was more than 65% of Russia's production. The Chelyabinsk enterprise exported about 20% of its output and used the rest to supply about 300 Russian metallurgical and machine manufacturing enterprises. In 2002, Chelyabinsk planned to produce 160,000 t of zinc. A new 200,000-t/yr-capacity electrolytic zinc smelter at Chelyabinsk was to be commissioned in 2002 to replace an old 146,000-t/yr-capacity smelter. The new smelter would not only have a larger production capacity, but would also meet 2001 environmental standards. The company's main shareholders were Euromin S.A. of Switzerland (51.74%), the Chelyabinsk enterprise's employees (6.2%), and the Chelindbank (6.15%) (Interfax Mining and Metals Report, 2002h).

Manganese.—***Ukraine.***—Ukraine contains about 75% of the FSU's manganese ore reserves (Danil'yants and others, 1999). The Balansovoy reserves ("economic reserves" according to the Soviet Reserve Classification System) of manganese ore are located in the Nikopol' Basin and total about 2.2 Gt. Located within the Nikopol' Basin are the Bol'shoy Tomak deposit, which accounted for 1.58 Gt of manganese ore; the Ordzhonikidze sector (western Nikopol'), 310 Mt; and the Marganets sector (eastern Nikopol'), 280 Mt (U.S. Bureau of Mines, 1994). Three types of ores—oxide, carbonate, and mixed oxide-carbonate—occur. The average grade of the oxide ore was 27.1% manganese; the oxide-carbonate ore, 25.6% manganese; and the carbonate ore, 17% manganese. Since 1975, Ukraine has mined oxide-carbonate and carbonate ores in addition to the richer oxide ores, which were being depleted. The carbonate ores were more difficult to process and were not suitable for producing high-grade concentrate (Bundesanstalt für Geowissenschaften und Rohstoffe, 1996; Postolovskiy and others, 2000).

In 2001, Ukraine produced 2.7 Mt of manganese concentrate, which was 1% less than that of 2000 (Interfax Mining and Metals Report, 2002bb). In 2001, the country was the world's second largest producer of manganese ore by manganese content (Jones, 2002). It produced less than 40% of the peak amount of manganese concentrate that it produced in the 1980s. The Ukrainian Republic had accounted for more than 85% of the manganese produced in the Soviet Union. Since the dissolution of the Soviet Union in 1991 and the end of Soviet political and economic control in Eastern Europe, the demand for manganese in this region, which was the primary consuming area, fell sharply. The country's manganese output was consumed domestically at ferroalloy plants and steel mills, but the output of these domestic industries had also fallen sharply.

In 2001, the Ordzhonikidze GOK, which was Ukraine's largest manganese concentrate producer, produced 1.696 Mt of concentrate, which was 7% less than that of 2000. Ordzhonikidze, which is located in the Dnepropetrovsk region, mined all its ore by open pit method (Interfax Mining and Metals Report, 2002bb).

Prior to a share issue in September, which tripled charter capital, Blumberg Industries LLC (United States) owned 24.9% of Ordzhonikidze's shares; other shareholders were Rafels Commodities Ltd. (United Kingdom, 23.88%) and St. John Trading Ltd. (Cyprus, 24.55%). Ukraine's Inter-regional Stock Union was the nominal holder of 26.37% of Ordzhonikidze's shares, and private individuals and various legal entities, among them Privat Intertrading, held the rest (Interfax Mining and Metals Report, 2002bb).

The Marganets mining and beneficiation complex, which was a manganese concentrate producer from the Dnepropetrovsk region, was Ukraine's only enterprise that mined manganese by underground methods. It mined 80% of its manganese underground and 20% from open pits. The Marganets enterprise included five underground mines (Nos. 1, 2, 3/5, 8, and 9/10), two open pits (Basansky and Grushevsky), a beneficiation plant, and a research and development complex for chemical equipment (Interfax Mining and Metals Report, 2002v).

Marganets' biggest consumers were Ukraine's Nikopol' and Zaporizhzhya ferroalloy plants. Privatbank owned 23.6% of Marganets' shares; Varkidge Limited, 10.4%; Blumberg Industries (United States), 25%; St. John Trading, 9.5%; Ulrich Limited (Cyprus), 8.5%; Oksidental Ltd., 8.2%; and Rafels Commodities, 9.5% (Interfax Mining and Metals Report, 2002v).

Marganets planned to mine 2.945 Mt/yr of ore by 2010. This will include 1.78 Mt from underground mines and 1.165 Mt from open pits. The company also planned to produce 1.14 Mt of manganese concentrate in 2002, which will require it to mine 2.29 Mt of ore and to strip 6.6 million cubic meters of overburden (Interfax Mining and Metals Report, 2002v).

To sustain production as a result of the depletion of reserves at the Nos. 1 and 2 underground mines, Marganets planned to commission the first stage of a separate section of the No. 9/10 underground mine in the first half of 2002 (Interfax Mining and Metals Report, 2002v).

Mercury.—***Kyrgyzstan.***—The state-owned Khaydarken mercury complex in Kyrgyzstan's Osh region produced 574.4 t of mercury metal in 2001, which was 4.5% more than the 549.9 t it produced in 2000. The complex exported 481.3 t of mercury, which was 8.4% less than that of 2000. The Khaydarken plant was the largest mercury producer in the CIS. The Kyrgyz State Property Fund owned all the shares of Khaydarken. At the end of 2001, Khaydarken's stockpiles contained 189.4 t of mercury (Interfax Central Asia and Caucasus Business Report, 2002c§).

Reserves of mercury ore and complex mercury-antimony-fluorspar ores from the Khaydarken/Novoye Chon-Koy-Su/Chauvay deposit total about 20 Mt and about 11.6 Mt for the Bol'shoy Khaydarken deposit, which formed the base for the Khaydarken Mercury GOK. The complex contained several mines and a beneficiation plant. Its main products were metallic mercury and fluorspar concentrate. Khaydarken produced only 600 t of mercury metal in 2000 compared with 800 t in 1990. Plans called for Khaydarken to process rich ores from small nearby deposits and also mercury-containing wastes stored in Russia, Western European countries, and other countries. Output was shipped to Asia, Europe, Russia, and other CIS countries (Kudayabergenov and Stavinskiy, 2001).

At the beginning of the 1990s, the Khaydarken complex, which was in an extremely difficult situation, was producing products at costs above the world price owing to the decrease in demand for mercury in agriculture, electronics, medicine, and other sectors of the economy. Khaydarken undertook a number of organizational changes, which included closing the unprofitable Chauvayskiy Mine and having the Ulutau Mine mothballed. Thus, production ceased at two of the three underground mines, and the volume of output was reduced by one-half. Application of economic criteria to the mining operations enabled Khaydarken to achieve economic stability and produce products for sale at competitive prices on world markets in the past several years (Aytmatov and Yalymov, 2001).

Molybdenum.—***Armenia.***—Production of molybdenum concentrate grew by 8.6% to 7,500 t in 2001 from 6,900 t in 2000. Sales of concentrates came to 41 billion dram ($8.5 million), which was 10 billion dram more than in 2000. Nearly all the concentrates were exported. Most mines increased production in 2001. Zangezur copper and molybdenum complex, which was the largest producer, raised output by 12% in value compared with that of 2000 (Yerevan Arminform, 2002§).

The Kadzharan copper-molybdenum deposit, which is located in the southern part of Armenia 33 km from the administrative center of Kapan, was one of the largest sources of molybdenum in the CIS and the world. Construction of the Kadzharan (later Zangezur) mining and beneficiation complex began in 1940 to develop this deposit. The complex produced its first copper and molybdenum concentrates in 1951. Although mining was initially underground, by 1959, all mining was from open pits. By 1985, capacity had been raised to the point where the complex was mining and processing 8.5 Mt/yr of copper-molybdenum ore; plans at that time called for the capacity to be increased in stages to 20.4 Mt/yr. The last general assessment of reserves at Kadzharan, which was completed in 1985, listed more than 1.5 Gt of explored reserves of copper-molybdenum ore, which was adequate to supply the complex for several centuries (Akopyan and others, 2001).

Following the dissolution of the Soviet Union in 1991, the rapid decline in production at the Zangezur complex resulted in a shutdown of work in 1993; the decline was caused by the loss of ties to former markets and the effects of the war with Azerbaijan, which included being blockaded. Production, however, resumed in 1995, and by 2000, the complex was mining and processing 7.1 Mt of ore; plans called for 7.6 Mt to be mined and processed in 2001. In an effort to process concentrates to produce more value-added products, the complex began production of molybdenum trioxide (Akopyan and others, 2001).

Also, during the decade following the dissolution of the Soviet Union, Armenia resurrected production at the Agarak copper-molybdenum mining and processing complex. The complex was able to mine and process 2 Mt/yr of ore, which was 70% of its design capacity. Armenia exported products from Agarak and Zangezur to six countries, which included Russia (Akopyan and others, 2001).

Nickel.—***Russia.***—OJSC MMC Noril'sk Nickel, which was one of Russia's leading enterprises and had metal mines and production facilities in East Siberia and on the Kola Peninsula, produced about 96% of Russia's nickel and 20% of the world's output of nickel; MMC Noril'sk Nickel mined copper-nickel mixed sulfide ores that also contain significant amounts of cobalt, copper, gold, and PGM. The vast majority of nickel and other metals produced by MMC Noril'sk Nickel were from its mines in East Siberia on the Taymyr Peninsula. The company also mined some nickel and other metals on the Kola Peninsula. Russia's remaining nickel was produced from laterite deposits in the Urals.

Ufaleynikel, which was a nickel producer from the Chelyabinsk region in the Urals, had the capacity to produce 17,000 t/yr of nickel, 5,000 t/yr of ferronickel, and 1,900 t/yr of cobalt. It produced 12,000 t of nickel in 2001 (Interfax Mining and Metals Report, 2002aw).

MMC Noril'sk Nickel's production increased to 223,000 t of nickel in 2001 from 217,000 t in 2000 (Prokhorov, 2002). Production increased because the company mined more ore and processed pyrrhotite tailings and other milling and metallurgical wastes.

Besides nickel, MMC Noril'sk Nickel's mines and plants produced coal, cobalt, copper, precious metals (gold, PGM, and silver), selenium, industrial sulfur, tellurium, and other products. The company was engaged in the exploring for, mining of, enriching of, and metallurgical processing of minerals; in the production, marketing, and sales of nonferrous and precious metals and nonmetallic minerals; and in the production of thermoelectric power for its own needs. MMC Noril'sk Nickel accounted for 4.3% of Russian exports. Its share of Russia's GDP was 1.9% and of Russia's industrial output was 2.8%, which equaled 27.9% of the nonferrous industry's output (Noril'sk Nickel, undated§).

The presence of copper-nickel mixed sulfide ore deposits on the Taymyr Peninsula in East Siberia has been known since the 17th century, but research into their industrial potential only began in the 1920s. On June 23, 1935, the Council of People's Commissars of the Soviet Union passed a resolution on building the Noril'sk combine. The Commissariat of Home Affairs (NKVD) (the country's secret police agency) initially directed the development of the project. In 1939, the Noril'sk complex produced its first copper-nickel matte. By 1953, the complex was producing 90% of the Soviet Union's PGMs, 35% of its nickel output, 30% of its cobalt, and 12% of its copper (Noril'sk Nickel, undated§).

In East Siberia, MMC Noril'sk Nickel's Polar Division operated six underground mines, one open pit, and processing facilities, which included concentrators, smelters, and refineries. Two company enterprises on the Kola Peninsula, Pechenganickel and Severonickel, produced copper and nickel. The Pechenganickel mining and metallurgical complex was in the northwest of the Kola Peninsula and had two industrial sites near the towns of Nikel' and Zapolyarnyy. Inco built the complex in 1940 in a part of Finland that became part of the Soviet Union after World War II. The Severonickel complex, which was built in 1935, operated in the town of Monchegorsk in the Murmansk region (Noril'sk Nickel, undated§).

On November 4, 1989, the Council of Ministers of the Soviet Union passed a resolution that created the State Concern for Non-ferrous Metals Production Noril'sk Nickel. The State Concern brought together the Noril'sk complex, the Pechenganickel and Severonickel complexes, and the Olenegorsk mechanical works on the Kola Peninsula with the Krasnoyarsk nonferrous-metals-processing plant in Krasnoyarsk, East Siberia, which produced PGMs and the Gipronickel Institute in St. Petersburg. These enterprises were united into a unified concern for producing and processing mixed sulfide ores (Noril'sk Nickel, undated§).

Following the dissolution of the Soviet Union, the Norilsk complex was called State Concern for the Production of Non-ferrous and Precious Metals Noril'sk Nickel. In June 1993, it was transformed by a decree of the President of the Russian Federation into the Russian Joint Stock Company (RAO) Noril'sk Nickel for the Production of Non-ferrous and Precious Metals. In 1994, in accordance with privatization plans, shares in the company were distributed, in part, to the workforce and for sale by voucher auctions. The control packet of shares (38% of the shares, or 51% of the voting shares) was retained, however, as state property. In November 1995, this controlling share was placed for sale at a mortgaging auction; the winner of the auction would lend the Government money and hold the shares as collateral. As a result of this auction, Uneximbank became the holder of the controlling packet of shares in RAO Noril'sk Nickel. Then, in August 1997, the investment company Swift, which represented Uneximbank's interests, acquired this controlling packet of shares for about US$270 million. As part of the announced terms of the acquisition, Swift transferred to RAO Noril'sk Nickel's accounts $300 million for the development of the Pelyatka gas condensate field near Noril'sk and Rub400 billion to maintain the social and civic infrastructure in the Noril'sk industrial region and to pay off outstanding debts of RAO Noril'sk Nickel to the state Pension Fund (Noril'sk Nickel, undated§).

In 2000, the Noril'sk enterprise again was restructured, its capitalization was transferred from RAO Noril'sk Nickel to Noril'sk Mining Company, which was renamed the Open Joint Stock Company Mining and Metallurgical Company Noril'sk Nickel in February 2001. This restructuring involved an additional share issue by Noril'sk Mining Company. The shares were placed through closed subscriptions among the shareholders of RAO Noril'sk Nickel and paid for by RAO Noril'sk Nickel's shares. RAO Noril'sk Nickel had swapped 96.92% of its shares by the end of 2001. An additional swap of shares for the RAO Noril'sk Nickel shareholders was to be conducted until July 17, 2002, for those who did not exchange their securities during the previous stages of restructuring. The company's largest shareholder became the Interros Group (Noril'sk Nickel, undated§).

Although resources of nickel-rich ore were depleting at existing mines, MMC Noril'sk Nickel planned to expand production at existing mines of copper-rich and disseminated ores, which have a lower nickel content and a relatively high PGM content. MMC Noril'sk Nickel was also planning to develop two new mines (the Glubokiy and Skalistyy) with nickel-rich ore, each of which will have the capacity to produce 2 Mt/yr of ore. The Glubokiy Mine was not slated for development until after 2010. The Skalistyy Mine was already under development and could be in full production in about 3 to 5 years. A third mine with nickel-rich ore could be developed after 2015. Along with increased volumes of cuprous and disseminated ores that were to be mined, these new mines should also compensate for the depleting reserves of nickel-rich ores at existing mines and allow Noril'sk to maintain a high level of nickel production (Levine and Wilburn, 2003§).

Platinum-Group Metals.—***Russia.***—In addition to being the world's second largest producer of PGMs after South Africa in 2001, Russia was the world's largest palladium producer because the ratio of palladium to platinum is higher in Russian ores than in South African ores. MMC Noril'sk Nickel mined more than 90% of the country's PGM output from mixed sulfide ores from its deposits at its Polar Division. An estimated 10 t/yr of PGMs (mostly platinum) was mined from placer deposits in the Russian Far East, Siberia, and the Urals; the largest placer mining companies were the Amur Prospectors cartel and the stock company AO Koryakgeoldobycha (Boryako, 2002).

All MMC Noril'sk Nickel's PGM mining is at its Polar Division where the ratio of palladium to platinum in the ore ranges from about 2.6 to 1 to 3.95 to 1. The Polar Division complex developed the Noril'sk, Oktyabr'skiy, and Talnakh deposits. These deposits have ores with varying PGM compositions—the Noril'sk deposit averages 71% palladium, 25% platinum, and 4% other PGMs; the Oktyabr'skiy deposit averages 64.5% palladium, 24.5% platinum, and 11% other PGMs; and the Talnakh deposit averages 64.8% palladium, 16.4% platinum, and 18.8% other PGMs (Smirnov, 1977). MMC Noril'sk Nickel's mining operations on the Kola Peninsula produced no PGM.

In 2001, PGM sales accounted for about 51% of Noril'sk's revenue; palladium accounted for about 33%; platinum, almost 14%; rhodium, almost 4%; and ruthenium and iridium, less than 1%. The volume in tonnage of PGM output increased by less than 1% in 2001, although from 1996 through 2001, the physical volume of PGM output had increased by about 28%. Production decreased by 14% in 1997 compared with that of 1996. Production increased, however, by 9% in 2000 compared with that of 1999; 4% in 1999 compared with that of 1998, and 30% in 1998 compared with that of 1997 (OJSC MMC Noril'sk Nickel, 2001§).

In 2001, Noril'sk's development strategy was oriented towards maximizing PGM production rather than nickel production. The company's remaining resources were richer in PGM relative to copper and nickel than ores that were previously mined and were being mined. Although mining was depleting the region's nickel-rich ores, the deposits still contained large resources with a high PGM content. Nickel-rich, copper-rich, and disseminated ores were the three forms of mixed sulfide ores that comprise the resource base at the Polar Division. The nickel content of cuprous and disseminated ores is considerably lower than in nickel-rich ores. The copper content of cuprous ores is slightly lower than in nickel-rich ores but much lower than in disseminated ores. Unlike base metal content, PGM content remains relatively high for all ore types. The PGM content of the nickel-rich ores that are now being mined averages between 9 to 13 g/t PGM, and of copper-rich ores, from 8 to 11 g/t PGM. The PGM content of disseminated ores ranges from 3 to 9 g/t; the PGM content of low-sulfide disseminated ores was quite comparable to the PGM content of nickel-rich ores. The PGM content in tailings was still quite high at 8 g/t. The quantities of these three types of ores and the tailings will affect Noril'sk's future as a PGM producer (Levine and Wilburn, 2003§).

Since World War II, most of the Polar Division base-metal production came from the mining of nickel-rich ores, generally from pockets with high-grade nickel or copper. Although PGM grades may have been significant, PGMs were treated as a byproduct of base-metal production. By 2000, however, disseminated ores constituted 82.2%; nickel-rich ores, only 10.5%; and cuprous ores, 7.3% of the district's total ore resources. Of total PGM resources, 65.9% was in disseminated ores; 20.8%, in nickel-rich ores; and 13.3%, in copper-rich ores (Valetvov and others, 2000). Stockpiled pyrrhotite (magnetic pyrites) tailings from previous mining operations constitute a resource of about 5% of total resources (Levine and Wilburn, 2003§).

If the ore is selectively mined, then ore feed grades can be significantly higher. The copper-rich ores had a generally higher palladium-to-platinum ratio than other ores. The palladium-to-platinum ratio in the other ores is somewhat variable, but the dominance of palladium to platinum is constant (Levine and Wilburn, 2003§).

As the district shifts from exclusively producing nickel-rich ores to producing other types of ores, the percentage of value attributed to PGMs will increase. On the basis of reported 1998 prices, PGMs made up almost 25% of the total value of nickel-rich ores and more than 50% of the value of disseminated ores (Hilliard, 1998; Levine and Wilburn, 2003§).

Noril'sk began to emphasize its Polar Division's PGM capacity about 1998. As nickel-rich reserves from Noril'sk Nickel's older mines were being depleted, the company was developing its abundant resources of copper-rich and disseminated ores. Noril'sk's plan envisioned opening two new underground mines (Glubokiy and Skalistyy) between 2000 and 2010, which will mine nickel-rich ores. The Glubokiy Mine may come into production by 2010. The Skalistyy Mine, which was originally scheduled to reach full production in 2001, appeared to be scheduled to achieve full production by 2005 (Piven' and others, 1996). A new mine may be opened to develop nickel-rich ores in the northern part of the Talnakh deposit after 2015 (Valetvov and others, 2002).

In addition, mining at the Oktyabr'skiy Mine was shifting from nickel-rich ores to copper-rich ores that have one-fourth of the nickel content but 90% of the PGM content (Piven' and others, 1999). Increased production of disseminated ores at other Polar Division mines was planned. Production at the two oldest mines (Medvezhiy Ruchey and Zapolyarnyy) was to expand into the recovery of low-sulfide disseminated ore that contains a much higher PGM content than ore recovered in 2001 (Valetvov and others, 2002). Meanwhile, Noril'sk Nickel continued to develop the capability to recover PGMs from abundant pyrrhotite tailings that accumulated from many years of mining (OJSC MMC Noril'sk Nickel, 2001§).

Apparently, total PGM production was planned to increase between 2000 and 2010. According to a USGS analysis of Noril'sk's plans, total PGM production was planned to increase by almost 50% from the 2000 level by 2010. By 2010, the percentage of reserves of nickel-rich ore would decrease and that of disseminated ore, which included low-sulfide disseminated ore, would increase as a percentage of the total available ore (Levine and Wilburn, 2003§).

On the basis of USGS projections, PGM production from disseminated ore could be maintained well beyond 100 years at projected 2010 PGM production levels. These projections were based on resources planned for development at Noril'sk and did not include placer mine production or development of other Russian PGM resources nor do they include economic or technical factors or changing market conditions (Levine and Wilburn, 2003§).

By mining a mixture of the different ore types and opening new mines, Noril'sk can extend the life of the various ore types (especially the nickel-rich ore). By appropriate blending and sequencing of the opening of new mines, appropriate ore grades could be maintained for a longer time than by sequentially mining high-grade nickel-rich ore zones and then mining lower grade ore types (Levine and Wilburn, 2003§).

Noril'sk has large resources of PGMs, which may be economically exploitable. USGS production projections were based on what could be possible if adequate investment and technology were available. Such an analysis is dependent on numerous cost factors, which include the future prices of PGMs and other cohosted metals. Furthermore, Noril'sk may not have mastered the technology for expanding mining or processing disseminated ores at all mines recovering nickel- and copper-rich ores or for processing low-sulfide disseminated ores. The USGS analysis did not deal with the issue of Noril'sk obtaining investment funds for future mine development or expansion of processing facilities to process larger quantities of ores of different types. Thus, issues that relate to future costs and the relative value of metals, new technologies, and acquisition of adequate investment funds could affect Noril'sk's future development prospects (Levine and Wilburn, 2003§).

The Krasnoyarsk Nonferrous Metals Plant (Krastsvetmet) and the Ekaterinburgskiy (EZOTsM) and Priobsk precious-metals plants process PGMs in Russia (OJSC MMC Noril'sk Nickel, 2001§). Krastsvetmet, which was Russia's major processor of PGM, processed 4% more PGMs in 2001 than it did in 2000; this repeated the 3% to 4% growth in 2000. Noril'sk will continue to supply Krastsvetmet in 2002 under the same terms as those of 2001. Krastsvetmet produced palladium and platinum ingots and powders; iridium, osmium, rhodium, and ruthenium powders; gold; and silver. The Krasnoyarsk Territory's state property management committee wholly owned Krastsvetmet (Interfax Mining and Metals Report, 2002r).

EZOTsM (a public stock company) became operational on October 23, 1916, as the first Russian plant refining PGMs. In 2001, EZOTsM produced precious metals from primary and secondary sources of gold and PGMs (iridium, osmium, palladium, platinum, and rhodium). EZOTsM refined precious-metal-containing raw materials that included concentrates, scrap, and wastes, into ingots and powder, and either sold the refined metals to the State Repository for Precious Metals or to banks or fabricated the metals into a range of products and semimanufactured products. It produced a large number of products from precious metals for industrial applications, which included such highly complex products for industrial use as catalytic netting, electrical contacts, glass apparatus, laboratory dishes, plates, powders, salts, thermocouples, tubes, wire, and alloys for stomatology.

By the end of the 1980s and the beginning of the 1990s, EZOTsM had also begun to produce a range of consumer products, which included jewelry. It was a unique plant within Russia and the CIS and the only plant that produced a full range of products from precious metals. It employed about 1,000 workers, 100 of whom were engaged in research (Timofeyev and Dmitriyev, 2001).

The traditional form of output for the plant had been catalysts and catalytic netting; in particular, platinum netting used for producing hydrocyanic acid and nitric acid. The plant was one of the first in Russia to produce measuring ingots from gold, platinum, and silver. The plant received international certification that confirmed the quality of its gold, palladium, platinum, and silver ingots for "good delivery" (Timofeyev and Dmitriyev, 2001).

EZOTsM refined iridium and produced iridium products from raw materials, which included concentrates and scrap. Technologies used at the plant enabled it to produce iridium of 99.95% purity. The plant was striving to widen its product range and to improve the quality of iridium products. From iridium, the plant produced mainly crucibles and containers used in high-temperature applications and radioisotopes. The plant also produced foil, ingots, rolled products, and wire (Yermakov and others, 2001). A future application for iridium being researched at the plant was its use in electrodes for ignition in automobile spark plugs that can last more than 250,000 km (Timofeyev and Dmitriyev, 2001).

EZOTsM supplied semimanufactures not only to Russia's jewelry production enterprises, but also produced jewelry from gold, palladium, platinum, and silver. EZOTsM, which was a leader in Russia in developing platinum jewelry production, developed alloys of palladium and platinum to be used in jewelry and also the solders used in alloys. The plant also had one of the first accredited laboratories for analyzing the quantity of precious metals in alloys, metals, products, solutions, and so forth. The plant's services were used at home and abroad (Timofeyev and Dmitriyev, 2001).

In the Soviet era, the production and consumption of platinum jewelry had been minuscule. Platinum was considered to be a strategic metal under the control of the state; and the state did not promote a market for platinum jewelry. After receiving a patent for a newly developed alloy for platinum jewelry in 1996, however, EZOTsM began producing platinum jewelry. It considered itself in a favorable position to produce jewelry owing to its long history of processing PGMs and, consequently, was developing a range of jewelry products and semiproducts used to produce finished jewelry (Timofeyev and others, 2002).

Tin.—***Kyrgyzstan.***—Tin was mined in such deposits as Trudovoye and Uchkoshkon in the Sary-Dzhas District in the southeastern part of Kyrgyzstan. Since 1992, the joint stock company mining enterprise Enil'chek has been extracting between 30,000 and 70,000 t/yr of ore for the production of between 150 and 350 t/yr of tin and between 90 and 120 t/yr of tungsten in concentrate, first from the At-Dzhaylau deposits and then from the Lesistyy sector of the Trudovoye deposit. The local Enil'chek prospecting cartel joint stock company shipped its output to Russia and other CIS countries (Kudayabergenov and Stavinskiy, 2001). Enil'chek developed the Kurgak Mine and a beneficiation plant with the capacity to process 100,000 t/yr in the Sary-Dzhas District (Aytmatov and Yalymov, 2001; Kudayabergenov and Stavinskiy, 2001).

The Trudovoye deposit was declared to be one of the largest tin deposits in the CIS with 149,100 t and 95,600 t of tin and tungsten reserves, respectively. An auction held for the right to develop the Central sector of the deposit was won by Deputatskiy Tin GOK from Russia, Enil'chek, and the Kyrgyzaltyn firm (Aytmatov and Yalymov, 2001).

In 2001, the Tyan'Shan'olovo GOK, which was created to develop the partially completed Sary-Dzhas Mine, began commercial operations and supplied 30 t of tin concentrate to Russia's Novosibirsk tin smelter. It planned to supply 250 t in 2002. Tyan'Shan'olovo was a limited liability company owned by OJSC Novosibirsk Integrated Tin Works (50%) and the Kyrgyz firms OSOO Amart (30%), Enil'chek (10%), and OOO Dzhangart (10%) (Interfax Mining and Metals Report, 2002au).

Russia.—OJSC Novosibirsk Integrated Tin Works, which was a monopoly tin producer, controlled Russia's only major tin smelter and a large share of the country's tin mining enterprises. In 1999, Novosibirsk acquired 52% of the shares of Dalolovo, which was established to develop the Solnechnyy deposit in Primor'ye; 50% of Tyan'Shan'olovo (Kyrgyzstan); and 51% of Khinganskoye'olovo (Jewish Autonomous District). It also owned 15% of Deputatskiy'olovo (Sakha Yakutiya) and was to be the trustee of the state-owned 11% share of this company for 3 years. Novosibirsk's owners included Russia's Sibirskaya Mnogoprofilnaya Kompaniya, FTK SibElfin, and ED-SIB-A, which owned 18%, 15%, and 14% of the shares, respectively. Other holders included ZAO Credit Suisse First Boston and the Depository and Clearing Center (Moscow) (Interfax Mining and Metals Report, 2001b).

In 2001, Novosibirsk produced 4,548 t of tin metal, which was 17% less than the 5,326 t it produced in 2000. Also, its solders output fell to 2,111 t compared with 2,287 t in 2000 (Interfax Mining and Metals Report, 2002x, w).

In 2001, Novosibirsk planned to buy 2,750 t of tin concentrate from Deputatskiy'olovo, which would be 7.8% more compared with that of 2000. Deputatskiy'olovo increased concentrate production owing to an investment program that provided $5 million to $6 million. Commercial mining at Tyan'Shan'olovo began in 2001. Also in 2001, Novosibirsk invested to rehabilitate Dalolovo by buying bulldozers, excavators, loaders, and other machinery. Dalolovo was set up to develop the Solnechnyy tin deposit, which the Solnechnyy mining and beneficiation complex had developed. Dalolovo's main owner was Novosibirsk (52%) (Interfax Mining and Metals Report, 2002w).

Titanium.—***Kazakhstan.***—AO Ust'-Kamenogorsk Titanium and Magnesium complex was Kazakhstan's only titanium-sponge-producing plant. Lacking its own domestic sources of titanium raw materials, the company adapted its technology to process imported raw materials, which included rutile and titanium slag. It produced enamels, magnesium, magnesium powder, metallic scandium, scandium oxide, titanium dioxide and sponge, and vanadium pentoxide. AO Ust'-Kamenogorsk exported all its titanium sponge and most of its magnesium to countries outside the FSU (Interfax Central Asia and Caucasus

Business Report, 2001a§). Belgium's Specialty Metals Company owned 65.67% of the shares in AO Ust'-Kamenogorsk, and Kazakhstan owned 15.5% (Interfax Central Asia and Caucasus Business Report, 2002d§). In 2001, sales from AO Ust'-Kamenogorsk, reported in the country's currency, increased by 76.3% compared with that of 2000 (Interfax Mining and Metals Report, 2002p).

Russia.—The Verknyaya Salda Metallurgical Production Association (VSMPO), which was the world's leading milled titanium producer, produced about 16,000 t/yr of titanium products for the aerospace and engineering industries. The company was located in Sverdlovskaya Oblast in the Urals. VSMPO exported 11,823 t of titanium products in 2001, which was a 50.4% increase compared with the 7,860 t it exported in 2000. VSMPO sold 70% of its output under long-term contracts with major aerospace and aviation companies, such as Airbus Industries S.A.S., Boeing Corporation, General Electric Aircraft Engines (a division of General Electric since 1987), and Rolls-Royce plc. VSMPO had a charter capital of Rub11,806,000 that consisted of 1-ruble common shares. ZAO Soyuz-Verkhnyaya Salda of Sverdlovskaya Oblast owned 38.61% of the shares in VSMPO, ZAO Credit Suisse First Boston 20.28%, and Depository-Clearing Company (Moscow) 16.55% (Interfax Mining and Metals Report, 2002ar; Foreign Broadcast Information Service, 2002§).

The Avisma Titanium-Magnesium complex, which was Russia's only titanium sponge producer, was one of the world's largest producers of titanium sponge with about 30% of the world production. VSMPO owned 75% of Avisma's shares; the Avisma company workers, 15%; and the Solikamsk Magnesium Plant, 10% (Interfax Daily Business Report, 2002§).

Following the September 11, 2001, terrorist attacks, Boeing informed VSMPO that it would not fulfill a number of major titanium supply contracts for an undetermined period of time because of losses by Boeing. VSMPO was the second largest supplier of parts for Boeing; between 18% and 20% of the weight of Boeing's latest models comprised titanium alloys manufactured by VSMPO (Belimov, 2001).

Ukraine.—Ukraine, which was the only major producer of titanium raw materials in the CIS, produced mainly ilmenite and also rutile. In 2001, the Vol'nogorsk State GMK in the Dnipropetrovs'k region increased outputs of rutile concentrate by 7.6% to 60,800 t and of ilmenite concentrate by 10% to 179,300 t compared with those of 2000. The GMK, which was established in 1961, mined and processed titanium-zirconium ores and was on the list of enterprises that were not to be privatized (Interfax Mining and Metals Report, 2002bd).

The state-owned Zaporizhya titanium and magnesium plant, which was Ukraine's only producer of titanium sponge, had the capacity to produce 20,000 t/yr of titanium sponge and germanium, magnesium, and silicon products. The plant exported most of its output outside the CIS. In January 2002, Zaporizhya spun off its silicon semiconductor division in accordance with a Government dictate; the new division became the state-owned Semiconductor Plant (Interfax Mining and Metals Report, 2002bi, bk).

Ukraine's state-owned Titan firm, which was the country's largest titanium dioxide (TiO_2) producer, produced 53,000 t of TiO_2 in 2001, which was a 6.9% increase compared with that of 2000. Titan accounted for 1.4% of the world's TiO_2 production and exported about 80% of its production. Titan supplied about 25% of the TiO_2 consumed in Russia (Interfax Mining and Metals Report, 2002ay).

Tungsten.—***Kyrgyzstan.***— Detailed information on tungsten can be found in the "Kyrgyzstan" part of the "Tin" section of this chapter.

Russia.—Tungsten reserves are geographically distributed as follows: North Caucasus, 46%; East Siberia, 29%; and the Russian Far East, 24%. The tungsten trioxide (WO_3) content of these reserves is on average 2.2 times lower than that of deposits under development in other countries (Novikov and Yastrzhembskiy, 1999). The Tyrnyauz tungsten and molybdenum GOK in the Kabardino-Balkariya Republic in the North Caucasus was Russia's largest tungsten producer. It reportedly had proven commercial tungsten reserves of 374.1 Mt of ore in categories A+B+C1, of which 264.1 Mt was suitable for underground mining and 110 Mt was suitable for surface development. Despite its large reserves, the ore grades at Tyrnyauz are considerably lower than those in foreign operations (Levine, 1997).

The only deposits that could be claimed to contain high enough quality ore to be considered reserves from a market economy perspective were those under development at the Lermontov and Primorskiy GOKs in the Russian Far East, which have ore with an average WO_3 content that ranges from 1% to 2.2%. These deposits, however, were reported to be nearly depleted. At the other tungsten mining enterprises, the average WO_3 content of the ore ranges from 0.17% to 0.24% (Novikov and Sazonov, 2000).

Tungsten reserves were decreasing. Production could be maintained by expanding capacity for mining tungsten ore at the Dzhida and Tyrnyauz complexes and also by developing reserves at the Aginskoye deposit in the Sakha Yakutiya Republic, the Kti-Teberdaskoye deposit in the North Caucasus, and a number of other small deposits with rich ore (Kozlovskiy and Shchadov, 1999).

Russian tungsten production was important to the United States because Russia, after China, was the second largest supplier of imported tungsten materials. In 2000, total imports of tungsten from Russia to the United States were 1,710 t of contained tungsten, which was 26% less than what Russia supplied the United States in 1999. In 2000, Russian tungsten exports to the United States were mainly tungsten oxide (49%), tungsten concentrates (23%), ammonium paratungstate (15%), tungsten waste and scrap (9%), and ferrotungsten and tungsten metal powder (each 2%) (Shedd, 2001).

The Tyrnyauz GOK produced 40% of Russia's tungsten-molybdenum concentrate. In a few years, the Tyrnyauz complex could produce the majority of Russia's tungsten because the Lermontov and Primorskiy GOKs in the Russian Far East could stop operating owing to depleted reserves and a lack of funds. Tyrnyauz produced 1,000 t of tungsten concentrate in 2001, which was 20% less than that of 2000. Ore extraction decreased by 15% to 600,000 t. Output fell because of mountain torrents in the second half of the year that interfered with mining operations and caused considerable damage to facilities (Interfax Mining and Metals Report, 2002av).

All the Tyrnyauz concentrates, which were produced in the form of tungsten anhydride at the Gidrometallurg plant at

Nal'chik in the North Caucasus, were exported to Rotterdam, Netherlands. The Russian republic of Kabardino-Balkariya owned 50% plus one share of the Tyrnyauz plant, which was privatized in 1999 (Interfax Mining and Metals Report, 2002av).

Vanadium.—***Russia.***—In 2001, about 7,000 t of vanadium pentoxide and 4,300 t of ferrovanadium were produced by Vanadii-Tulachermet, which was Russia's major producer of vanadium and vanadium alloys; it was located in the Tula region of central Russia. In 2001, production of vanadium pentoxide (V_2O_5) increased by 11% compared with that of 2000, but net profit was 11.3% less than in 2000 because world prices for V_2O_5 fell by 24%. The enterprise exported most of its output to Southeast Asia and Western Europe. As of April 2001, Western Projects L.L.C. of the United States owned 14.96% shares of Vanadii-Tulachermet stock; ZAO Intersintez (Moscow), 13.29%; Alef-Bank (Moscow), 13.17%; OOO Adamant (Moscow), 10.02%; and OOO Ivan (Tula, Russia), 9.32%. Information was not available on the ownership of the remaining shares of the enterprise (Interfax Mining and Metals Report, 2002at).

Zirconium.—***Ukraine.***—The Vol'nogorsk State GMK in the Dnipropetrovs'k region, which was the only producer of zirconium in the CIS, increased output of zirconium concentrate by 2% to 33,600 t in 2001 compared with that of 2000. The complex, which was established in 1961, was on the list of enterprises that were not to be privatized (Interfax Mining and Metals Report, 2002bd).

Industrial Minerals

Barite.—***Kazakhstan.***—Demand for barite by Kazakhstan's oil industry was 200,000 t/yr. Most of Kazakhstan's oil producers bought barite abroad mainly from Turkey and Iran. In 2001, the Yuzhpolimetall complex in southern Kazakhstan planned to produce more than 43,000 t of barite concentrate. By 2005, Yuzhpolimetall planned to raise production of barite concentrate to 200,000 t (Interfax Central Asia and Caucasus Business Report, 2001b§).

Diamond.—***Armenia.***—In 2001, Armenia exported $100 million in cut diamonds, which was 9% less than it exported in 2000. Armenia's cutting industry is working at only about one-third of its capacity. ALROSA, which was major supplier of rough diamonds to Armenia, estimated that Armenia was capable of processing 1.2 million carats per year, compared with its annual output of between 300,000 and 350,000 carats in 2001 (Interfax Mining and Metals, 2002e).

According to the terms of a new trade agreement signed with Russia, Russia will greatly increase it supply of diamonds to Armenia from the 2001 level of 30,000 carats; Russia will supply Armenia with 400,000 carats of gem diamond per year from 2002 to 2004 and then 450,000 carats per year in 2005 and 2006. Russia will also supply 400,000 carats of industrial diamond to Armenia in 2002 and increase this by 100,000 carats per year until 2006. The diamond will be supplied under annual export quotas approved by the Russian Government and under contracts signed by ALROSA and Almazjuvelirexport with an authorized Armenian agency in accordance with the legislation of both countries. ALROSA will supply its own diamond for jewelry manufacturing, and Almazjuvelirexport will supply diamond owned by the Sakha Yakutiya Republic, which are suitable for jewelry. Under the agreement, Armenia was not allowed to reexport uncut diamond supplied or to export partially cut diamond. The diamond to be received from Russia will constitute about one-half of Armenia's cutting plant requirements. The country will probably import the other one-half from Belgium and Israel (Interfax Mining and Metals Report, 2002e).

Armenia was deciding how to distribute the Russian rough diamond among cutting plants by taking into consideration the various plants' diamond-cutting capacities and assessments of their financial condition and marketing record. In 2001, Russian diamond were allocated to 43 cutting enterprises, but 10 to 15 of them used either none or only part of their allocation owing to financial and market constraints (Interfax Mining and Metals, 2002e).

Russia.—The Russian diamond industry was controlled by ALROSA Company Limited, which was based in the Sakha Yakutiya Republic. ALROSA's largest shareholders were the Russian Ministry of State Property, 32%; the Sakha Yakutiya Republic's State Property Committee, 32%; the Russian Social Welfare Fund for Servicemen, 5%; and eight administrative districts in which ALROSA operated (8% among them) (Interfax Mining and Metals Report, 2002bh).

In 2001, ALROSA produced 20,500 carats valued at $1.543 billion and increased mine output by 2.6% compared with that of 2000. Sales of uncut diamond increased to $1.738 billion in 2001 from $1.46 billion in 2000. In 2001, combined revenues from the sale of cut and uncut diamond exceeded those of 2000 by $195.5 million, or 12.7%. ALROSA, which produced $130 million instead of $150 million worth, however, did not attain its production target for cut diamond in 2001 (Interfax Mining and Metals Report, 2002c).

ALROSA was planning to spend $2.8 billion during the next 5 years mainly to develop underground mining operations at the Aikhal, Mirny, and Udachnyy enterprises in Sakha Yakutiya and at the Lomonosov project in Arkhangel'skaya Oblast. In 2001, the International Mine was ALROSA's only underground mining operation. ALROSA will spend $350 million to develop the Lomonosov project. Production at Lomonosov was expected to start in 2003 (U.S. Geological Survey, unpub. data, 2002).

In 2002, the Sever-Almaz firm was planning to start developing the Arkhangel'skaya pipe, which was part of the Lomonosov deposits. More than 71% of the stock in Sever-Almaz was owned by ALROSA. The deposits were estimated to contain $12 billion in diamond of which more than one-half was considered to be gem quality (Interfax Mining and Metals Report, 2002z).

In the next few years, ALROSA planned to raise mine output to $2 billion per year. To achieve this, the company will have to finish building an underground mine at the Mir diamond pipe and a section of the Aikhal underground mine and to start constructing an underground mine at the Udachnaya pipe and an open pit at the Komsomol'skaya pipe (Interfax Mining and Metals Report, 2002c).

Although the open pit at Mir was depleted, the pipe could yield diamond for many more years by mining underground.

The Aikhal underground mine should go onstream in 2006; the Mir underground mine, in 2007-08; and the Udachnyy underground mine, in 2010 (Interfax Mining and Metals Report, 2002b, I). By switching to underground mining, ALROSA believed that it had enough reserves to last for an additional 40 years (Interfax Mining and Metals Report, 2002a).

In 2001, about 50% of ALROSA's production came from several mining and beneficiation enterprises. The Udachnyy GOK, which comprised the Udachnyy and Zarnitsa Mines, produced about 25%; this percentage was projected to increase to 35% by 2010. The Mirny mining and beneficiation enterprise comprised the International and Mir Mines, which produced about 25%; this percentage was projected to decrease to 17% by 2010. The Aikhal GOK comprised the Aikhal and Komsomol'skiy Mines, which produced about 20%; this percentage was projected to decrease to 18% by 2010. The Anabaraskiy GOK comprised alluvial mines and produced about 5%; this percentage was projected to remain at 5% by 2010. Although the Nyurbinskiy GOK comprised the Botuobinskiy and Nyurbinskiy Mines, it was not in operation in 2001; it was projected to produce 25% of ALROSA's output by 2010 (U.S. Geological Survey, unpub. data).

ALROSA officials stated that geological exploration needed to be increased. Promising sites included the Verkne-Modunskoye field, which is located 120 km from the city of Udachnyy, where four pipes were discovered in Soviet times. Mining each of the pipes separately was not considered to be feasible at that time. According to the officials, the project could succeed with modern technology and if the pipes were mined together. Further exploration was being carried out at the site (Interfax Mining and Metals Report, 2002c).

Fluorspar.—***Kyrgyzstan.***—In 2001, the state-owned Khaydarken mercury complex from Kyrgyzstan's Osh region produced 1,175 t of fluorspar concentrate, which was a 63.6% decrease compared with 3,000 t produced in 2000. Fluorspar from Kyrgyzstan was consumed by such countries as Kazakhstan, Russia, and Ukraine. The complex had trouble selling its concentrate because its prices were too high owing, in part, to the cost of shipping the concentrate via Kazakhstan, Tajikistan, and Uzbekistan. In 2001, the complex exported 1,888 t of its fluorspar concentrate, which was a decrease of 42.9% compared with that of 2000. At the start of 2002, stockpiles contained 3,677.3 t of fluorspar concentrate. The Kyrgyz State Property Fund owned all Khaydarken shares. Khaydarken was on the list of enterprises scheduled for privatization (Interfax Central Asia and Caucasus Business Report, 2002c§).

Russia.—Russia has 68% of the fluorspar reserves in the CIS; the remaining reserves were in Kazakhstan, 16.5%; Uzbekistan, 6.7%; Tajikistan, 4%; Kyrgyzstan, 0.6%; and Ukraine (small deposits). Russia reportedly had 16.4 Mt of confirmed fluorspar reserves in 32 fluorspar deposits, of which 11 were developed. The average fluorite content of Russia's reserves range from 41.9% to 59%; Russia had no single deposit with high-grade ore. Russian fluorspar production fell precipitously to 6,200 t of fluorspar concentrate in 1997 from 365,000 t of fluorspar concentrate in 1992. The industry then began to revive when production increased from 120,200 t of fluorspar concentrate in 1998 to 153,800 t in 1999 and to 187,600 t in 2000 (Zuev, 2002).

Most fluorspar was mined in two eastern regions of the country—in the Maritime (Primor'ye) region of the Russian Far East by the Yaroslavskiy GOK and in the Chita region of the Transbaikal area by the Kalanguiskiy fluorspar mining complex and by the Usugli Mine. A number of other small producers were also active. The Yaroslavskiy GOK developed the Vosnesenskoye and Pogranichnoye deposits.

Mineral Fuels

Coal.—***Kazakhstan.***—Kazakhstan's total geological coal resources were assessed to be between 150 and 160 Gt, of which 62% are termed "economic reserves of brown coal," and the remainder, "hard coal" in Kazakhstan's Reserve Classification System. The majority of these reserves are in the central part of the country in the Ekibaztuz, Karaganda, and Maykuben coal basins and the Borlinskoye, Kuu-Chekinskoye, Shubarkol'skoye, and Yubeleynoye deposits (Aliyev, 2001).

Kazakhstan was a large coal producer, consumer, and exporter. It had been the third largest coal producer in the Soviet Union behind only Russia and Ukraine in total output. In the 1990s, coal accounted for about one-half of Kazakhstan's total primary energy consumption, although coal consumption fell by about 50% during this period. In 2000, the country's coal consumption increased for the first time since independence (U.S. Energy Information Administration, 2002b§).

Between 1992 and 1999, the country's coal production, which was centered in the Ekibaztuz and Karaganda Basins, declined by 54%. After nearly a decade of decline, coal production increased in 2000. In 2001, the country's main coal mining enterprise Bogatyr' Access Komir (BAK) (a subsidiary of Access Industries, Inc. of the United States) maintained its 2000 coal production level with production of about 30 Mt of coal from the Bogatyr' and Severnyy coalfields in northern Kazakhstan. Maykuben-Vest, which mined brown coal in the Pavlodar region, produced about 1.8 Mt of coal in the first 10 months of 2001; this was 57.6% more than in the same period in 2000. Through the first 6 months of 2001, the Vostochnyy open pit mine increased production by more than 25.2% to more than 9 Mt compared with that of 2000 (U.S. Energy Information Administration, 2002b§).

Kazakhstan, which was the largest exporter of coal to the FSU, accounted for almost one-half of the FSU's coal shipments. Russia remained the largest importer of Kazakhstan's coal followed by Ukraine. Kazakhstan announced plans to increase coal production to more than 85 Mt/yr by 2005, of which about two-thirds will be used domestically and one-third will be exported (U.S. Energy Information Administration, 2002b§).

Kyrgyzstan.—In 2001, Kyrgyzstan listed 70 coal deposits with reserves that totaled 2.3 Gt; 20 deposits registered reserves of more than 1 Gt. At the majority of deposits, however, the coal resources are characterized by complex geological and mining conditions, which require the introduction of technological solutions (Aytmatov and others, 2001).

Kyrgyzstan's coal industry was one of its oldest mineral producing industries. Up until 1980, the industry had been continuously increasing output. Production peaked between

1976 and 1980 when output averaged about 4.2 Mt/yr; about 2.6 Mt/yr came from underground mines, and 1.6 Mt/yr, from open pits. Since 1980, production had been continuously decreasing, with a steep decline following the dissolution of the Soviet Union in 1991. By 2000, the country was mining only 320,000 t of coal. The industry was in dire economic straits owing to the industry's lack of ability to compete in either domestic or export markets with the rise in the cost of inputs and the removal of Government subsidies. The distances involved in reaching customers combined with the low quality of the coal resulted in the industry's former reserves being regarded as too uneconomic even for production for the domestic markets (Aytmatov and others, 2001).

In 2001, the coal industry had 12 operating mines and open pits and 5 auxiliary enterprises and organizations. Coal was mined at the Almalyk, Dzhergalan, Karakeche, Kok-Yangak, Kyzyl-Kiya, Sulyukta, and Tash-Kumyr deposits (Aytmatov and others, 2001).

Russia.—The Russian coal industry experienced a period of declining production and restructuring following the dissolution of the Soviet Union. During the past 3 years, production increased as the Russian economy grew and domestic demand for coal increased. The greatest increases in coal output were in the West Siberian economic region, specifically in the Kuznets Basin (Kuzbass), where coal production for the past 3 years increased by 32.9% and also in the East Siberian economic region where coal production increased during this period by 19.8%; increases were smaller in the northern economic region (17%) and the Far East economic region (4.4%). Production in the remaining economic regions where coal was produced declined. For example, production in the Urals economic region decreased by 37%, and the North Caucasus economic region, by 13%. Worker productivity reportedly averaged 120 metric tons per month mined. The rates of accidents and fatalities decreased during the past 3 years; the rate of fatalities decreased to 0.45 from 0.8 per 1 Mt of coal extracted (Tropko, 2002).

The coal industry has been investing in new capacity along with phasing out unprofitable enterprises. In 2001, the industry added 21.5 Mt of capacity; 15.5 Mt of this increase was based on reequipping enterprises, and 6 Mt, on constructing new capacity. In 2001, total capacity of the mines and open pits increased to 279 Mt compared with 267.5 Mt in 2000. Because of the process of privatization that took place when the industry was restructured, the Russian coal industry comprised more than 500 private enterprises and their subsidiaries in 2001. Private firms accounted for 72% of the country's coal output with a target set for 2002 to rise to 92% with the sale of Government assets (Tropko, 2002).

The coal industry, however, was facing competition selling to powerplants that were shifting to using natural gas, which was cheaper than coal. In 2001, coal accounted for 28.3% of fuel supplied to electric powerplants, and natural gas, 66.6% (Tropko, 2002).

Ukraine.—Ukraine has 34.1 Gt in proven coal reserves, which accounted for about 15% of the FSU's total coal reserves (U.S. Energy Information Administration, 2002e§). The decrease in coal extraction since independence ended in 1998. Coal extraction reached 81 Mt in 2000 and 83.9 Mt in 2001. Goals were set to stabilize coal extraction at between 85 and 90 Mt. Most of Ukraine's coal is mined in the Donets Basin (Donbas) in the eastern region of the country.

The decline in Ukraine's coal production during the 1990s was caused, in large part, by the collapse of domestic demand and the closing of heavy industry as Ukraine's economy contracted. The coal industry had 193 mines and employed around 450,000 workers. About two-thirds of the mines were unprofitable. The industry experienced numerous problems, such as hazardous working conditions, large debts, outmoded equipment, consumer nonpayment, inefficiency and low productivity, labor strikes, and unpaid wages. Ukraine's coal mining sector remained heavily subsidized by the Ukrainian Government and had the world's highest death rate mostly because of obsolete equipment and low safety standards. Ukraine had nearly 300 coal mining fatalities in 2001 (U.S. Energy Information Administration, 2002b§).

Privatization in the coal sector has progressed slowly since the process began. A $300 million World Bank structural adjustment loan designed to close down more than 80 unprofitable open pits between 1997 and 2000 had not resulted in the closure of even one-half of those mines (U.S. Energy Information Administration, 2002b§).

In September, Ukraine's cabinet approved an $8.8 billion program to revive the country's coal sector during the next 10 years. The program will promote the industry by engaging in a number of fiscal measures to improve asset management and to seek investment. The program called for reducing the industry's high level of debts before proceeding with further privatization. The program also sought to improve mine safety and to reduce the number of coal mines to 157 in 2010. Ukraine has been reluctant to close mines owing to the social costs of closing mines in areas with few other jobs (U.S. Energy Information Administration, 2002e§).

Natural Gas.—***Azerbaijan.***—Azerbaijan was forced to import natural gas to meet domestic demand, even though it has proven natural gas reserves of roughly 155 billion cubic meters (4.4 trillion cubic feet) with the potential to discover significant additional reserves. The infrastructure was inadequate for delivering the full production of natural gas from offshore fields, which are the source of the majority of the country's production. Consequently, much natural gas was flared instead of being piped to markets. In 1999, the country enacted a law that required new oil development projects to include a plan for developing their natural gas resources. With production decreasing at the Bakharly field, which was the country's main source of natural gas, Azerbaijan's future natural gas production will depend on development of the Gunesli, Nakhchyvan, and Shah-Deniz offshore fields (U.S. Energy Information Administration, 2002a§).

The Shah-Deniz field was considered to be the world's largest natural gas discovery since 1978 and was estimated to contain between 700 billion cubic meters (25 trillion cubic feet) and 1.1 trillion cubic meters (39 trillion cubic feet) of natural gas. The field should produce its first natural gas by 2004. With the development of this offshore field, the country could become a major net exporter of natural gas during the next decade (U.S. Energy Information Administration, 2002a§).

Kazakhstan.—In 2001, Kazakhstan produced about 11.6 billion cubic meters (400 billion cubic feet) of natural gas, which was a slight increase compared with that of 2000.

Because it had 1.85 trillion cubic meters (65 trillion cubic feet) of proven natural gas reserves, Kazakhstan was ranked among the top 20 countries in the world in terms of natural gas reserves. Because of a lack of infrastructure, Kazakhstan's natural gas reserves were significantly underdeveloped. Kazakhstan lacked pipelines to connect its natural gas reserves, which are located mainly in the western part of the country with its areas of large potential consumption in the northern and southern regions. Many of the country's oil producers flare natural gas instead of using it because Kazakhstan has no transport infrastructure. To improve the development of the country's natural gas industry, Kazakhstan's Government passed in August 1999 a law that required subsoil users, such as oil companies, to include natural gas utilization projects in their development plans (U.S. Energy Information Administration, 2002b§).

More than 40% of Kazakhstan's proven natural gas reserves was in one field, the giant Karachaganak field, which is located near the northwestern border with Russia. Kazakhstan's other significant natural gas deposits included the Tengiz, Urikhtau, and Zhanazhol fields. Undeveloped offshore areas, which included the giant Kashagana offshore oil field, were thought to hold large amounts of natural gas (U.S. Energy Information Administration, 2002b§).

Russia.—Russia was the world's largest natural gas producer and exporter and had the world's largest natural gas reserves. It had almost 50 trillion cubic meters (more than 1,700 trillion cubic feet) of proven natural gas reserves. Natural gas accounts for more than 54% of Russia's energy consumption (U.S. Energy Information Administration, 2002c§).

In 2001, Russia produced about 581 billion cubic meters (20 trillion cubic feet) of natural gas, which was a slight decrease compared with that of 2000. It consumed about 390 billion cubic meters (14 trillion cubic feet) and had almost 190 billion cubic meters (7 trillion cubic feet) in net natural gas exports. In 2002, Russia planned to increase natural gas production to about 600 billion cubic meters (more than 21 trillion cubic feet) and projected domestic natural gas consumption to increase to about 413 billion cubic meters (more than 14.5 trillion cubic feet).

Gazprom, which was the state-run natural gas monopoly, held nearly one-third of the world's natural gas reserves and produced nearly 94% of Russia's natural gas. Gazprom employed approximately 38,000 workers and was Russia's largest earner of hard currency. Gazprom's tax payments accounted for about 25% of the Government's tax revenues. It also operated the country's almost 145,000-km natural gas pipeline grid and 43 compressor stations. Russian oil companies, however, have flared much of their associated natural gas instead of treating it and selling it to Gazprom because, in part, satisfactory agreements were not concluded between the oil and the gas industries regarding shipping associated gas through Gazprom's pipeline grid (U.S. Energy Information Administration, 2002c§).

Gazprom's main producing areas were the Urengoy and Yamburg fields in northern West Siberia in the Yamal-Nenets region. It was planning for the future development of the giant Bovanenko field on the Yamal Peninsula and other fields in the Yamal-Nenets region, which included the giant Pestsovoyy and Zapolyarnyy fields to the north in the Ob-Taz Gulf area. Rosshelf (a subsidiary of Gazprom) was responsible for the development of the Schtokmanov field in the Barents Sea and other fields in the North Caucasus, Precaspian, Timan-Pechora, and Volga-Urals regions. Production in the Urengoy and Yamburg natural gasfields, however, was declining, and planned development of new fields continued to be delayed as a result of lack of investment resources (U.S. Energy Information Administration, 2002c§).

Development of the giant Zapolyarnyy field, which was brought onstream in October 2001 and should offset the decline in the company's production, was the only recent investment in new natural gas production that Gazprom has made. Development of future fields, most of which are located in the remote regions that lack the infrastructure to deliver the natural gas to consumers, will require much higher levels of investment (U.S. Energy Information Administration, 2002c§).

In an attempt to spur investment in the industry and to raise production levels, steps were taken to end Gazprom's monopoly position and to restructure the natural gas sector. In November 2000, the Government ordered Gazprom to give other companies the right to use up to 15% of its pipeline capacity. In May 2001, Gazprom's board of directors replaced its long-time director (U.S. Energy Information Administration, 2002c§).

The Russian Government's policy of keeping domestic natural gas prices artificially low means that the country's natural gas industry was heavily dependent on exports for revenues to finance its production. In 2001, the majority of Russia's gas exports went to customers outside the CIS. Gazprom supplied Europe with 25% of its natural gas. With several new export pipelines planned for or already under construction, Russia hoped to increase this percentage in the next decade (U.S. Energy Information Administration, 2002c§).

In an effort to diversify its export routes and reach new markets, Russia planned to build several new natural gas export pipelines. The Blue Stream pipeline to Turkey was the major planned project for Russia's export diversification strategy. The pipeline, which will supply Turkey with almost 16 billion cubic meters (212 billion cubic feet) per year of natural gas via twin pipelines laid on the bottom of the Black Sea, was nearing completion and should be operational by fall 2002 (U.S. Energy Information Administration, 2002c§).

In December 2001, Russia resolved a dispute with Ukraine that concerned Ukraine's unsanctioned removal of natural gas from the Russia pipeline system and accordingly canceled plans to build another pipeline to bypass Ukraine. Plans were proceeding for the construction of the second branch for the Yamal-Europe pipeline via Belarus. In addition, Russia was considering pipelines to the east to China (U.S. Energy Information Administration, 2002c§).

To maintain its export level in the face of declining production, Gazprom, through natural gas trader Itera, contracted to buy more than 10 billion cubic meters (350 billion cubic feet) of gas from Turkmenistan in 2002. As Kazakhstan, Turkmenistan, and Uzbekistan continued to develop their natural gas industries and increase their production, senior Russian officials called for an Eurasian alliance, which will, in some ways, be similar to OPEC and would unite Russia with these three large natural gas-producing countries in Central Asia (U.S. Energy Information Administration, 2002c§).

Turkmenistan.—With natural gas production of almost 80 billion cubic meters per year (3 trillion cubic feet per year), Turkmenistan was the second largest natural gas producer following Russia among the republics of the Soviet Union. After Turkmenistan became independent, its natural gas began to compete for markets with Russia's natural gas. Turkmenistan's only natural gas export pipeline routes ran through Russia, and Russia began to limit Turkmenistan's natural gas exports. Turkmenistan's natural gas production, consequently, decreased throughout the 1990s. As a result of resolving a pricing dispute with Russia and the construction of an export pipeline to Iran, Turkmenistan's natural gas production began to increase in 1998. In 2001, the country produced more than 46.3 billion cubic meters (1.6 trillion cubic feet) of natural gas, with domestic consumption of only about 736 million cubic meters (26 billion cubic feet). The state-owned Turkmengaz produced 85% of this total, and the state-owned oil-producer Turkmenneft, the remaining 15% (U.S. Energy Information Administration, 2002d§).

Turkmenistan was one of the world's leading countries in natural gas reserves with proven natural gas reserves of almost 2.9 trillion cubic meters (101 trillion cubic feet). Its largest natural gas fields are in the Amu-Dar'ya Basin. About one-half of the country's natural gas reserves were estimated to be in the giant Daulatabad-Donmez field. Besides the Amu-Dar'ya Basin, Turkmenistan had large natural gas reserves in the Murgab Basin and, in particular, the giant Yashlar deposit, which contained an estimated 765 billion cubic meters (27 trillion cubic feet). During the last decade, Turkmenistan discovered 17 new natural gas deposits in the Dashoguzskiy, Lebapskiy, and Maryyskiy regions (U.S. Energy Information Administration, 2002d§).

Turkmenistan's economic growth was closely linked to increasing its natural gas production and exports, and the country was continuing to explore and develop new deposits. The country has not been able to develop its natural gas resources fully because it lacked pipeline outlets to world markets. For the country to develop its natural gas production potential, the problem of getting its natural gas to customers who will pay in hard currency and in a timely manner needs to be solved. Now Turkmenistan must transport its natural gas through Russian pipelines to CIS states that either could not pay fully in cash or were late in paying. For example, in October 2000, Turkmenistan agreed to resume exporting natural gas to Ukraine, which had been suspended in May 1999 because of its $281 million natural gas debt (U.S. Energy Information Administration, 2002d§).

In May 2001, Turkmenistan concluded a major natural gas export deal with Ukraine. Under the terms of the agreement, Turkmenistan will provide Ukraine with about 2.65 trillion cubic meters (8.83 trillion cubic feet) of natural gas between 2002 and 2006. Turkmenistan will sell Ukraine approximately 40 billion cubic meters (1.41 trillion cubic feet) of natural gas in 2002 and 50 billion cubic meters (1.77 trillion cubic feet) in 2003; the remaining deliveries will be agreed to later provided that Ukraine makes timely payments. Ukraine agreed to pay 60% in cash for Turkmenistan's natural gas; the remainder will be paid through Ukraine's participation in 20 construction and industrial projects in Turkmenistan, which will be worth $412 million (U.S. Energy Information Administration, 2002d§).

Uzbekistan.—Uzbekistan ranked as the second largest natural gas producer after Russia in the FSU and was one of the top 10 natural-gas-producing countries in the world. Since becoming independent, Uzbekistan has increased its natural gas production by more than 30%. The country has estimated natural gas reserves to be almost 1.9 trillion cubic meters (66.2 trillion cubic feet). Natural gas was produced from 52 fields in the country; 12 major deposits, which included the Gazli, Khauza, Pamuk, and Shurtan-Say, accounted for more than 95% of Uzbekistan's natural gas production. These deposits are concentrated in the Amu-Dar'ya Basin and in the Mubarek area (U.S. Energy Information Administration, 2002f§).

Uzbekistan's natural gas fields were heavily exploited in the 1960s and 1970s by the Soviet Union. As a result, production was declining at several older fields, such as the Uchkyr and Yangikazgan. To offset these declines, Uzbekistan was increasing its pace of development of existing fields, such as the Gazli and Shurtan-Say; developing new fields; and exploring for new reserves. The Shurtan-Say field, which began producing in 1980 and is located in the Kashkad'ya region in the southwestern part of Uzbekistan, was the second largest in the country after Gazli and accounted for approximately 36% of Uzbekistan's natural gas output in 2001 (U.S. Energy Information Administration, 2002f§).

Owing to its high sulfur content, the majority of Uzbekistan's natural gas requires processing. Most natural gas was processed at the Mubarek gas-processing plant, which had a throughput capacity of more than 28 billion cubic meters per year (1 trillion cubic feet per year). In December 2001, Uzbekneftegaz commissioned the Shurtan Gas-Chemical Complex, which included installations to clean natural gas, a natural gas booster compressor station, and a plant with the capacity to produce 137,000 t/yr of liquefied natural gas and 125,000 t/yr of polyethylene. The complex, which was located near the Shurtan-Say gasfields, was completed at a cost of $1 billion (U.S. Energy Information Administration, 2002f§).

In addition to the Shurtan plant, Uzbekneftegaz engaged in several projects to ensure the country's natural gas supply; for example, opening the Khodzhaabad underground natural gas storage facility in the Andizhan region in 1999. The Khodzhaabad facility made possible increased natural gas shipments to Uzbekistan's industrial heartland in the Fergana Valley. In January 2001, Trinity Energy of the United Kingdom committed to investing more than $400 million during a 40-year period in exploration and production of gas condensate deposits in the Ustyurt Plato region. In March 2002, Russia's Itera and Lukoil signed a production-sharing agreement (PSA) with Uzbekneftegaz to form a joint-stock company to develop several new gas fields in Uzbekistan, which included the giant Kan-Dam field. Natural gas reserves at the fields covered by the PSA are estimated at almost 330 billion cubic meters (8.1 trillion cubic feet), including approximately more than 150 billion cubic meters (5.4 trillion cubic feet) at the Kan-Dam structure. Itera and Lukoil each will hold 45% shares in the company, and Uzbekneftegaz will keep a 10% stake in the joint stock company (U.S. Energy Information Administration, 2002f§).

Petroleum.—***Azerbaijan.***—Azerbaijan's economic development was based on its vast oil and natural gas resources in the Caspian Sea region. Production of crude oil and refinery products composed about 20% of Azerbaijan's GDP and more than 70% of Azerbaijan's exports. Revenues from oil-related exports accounted for almost 50% of budget revenues. Owing to extensive oil development combined with a lack of environmental protection measures, Azerbaijan's coastline and the Caspian Sea suffered heavy environmental damage during the Soviet era. Following independence, Azerbaijan's enormous potential reserves in undeveloped offshore Caspian fields attracted international investors and multinational energy companies began major investments in the country's oil sector (U.S. Energy Information Administration, 2002a§).

In 2001, Azerbaijan's oil production increased for the fourth straight year. Output rose to 14.9 Mt in 2001 from 14 Mt in 2000. More than 80% of Azerbaijan's oil production was from offshore fields with a significant percentage coming from the shallow-water section of the Guneshli field 100 km off the country's coast. At yearend 2001, Azerbaijan had signed 21 major agreements for oil development with 33 companies from 15 countries. Not all these projects were successful. Owing to development of new fields in the Caspian Sea through joint ventures and production-sharing agreements (PSAs), Azerbaijan's oil exports could exceed 1 million barrels per day (Mbbl/d) by 2010 and 2 Mbbl/d within 20 years (U.S. Energy Information Administration, 2002a§).

Azerbaijan International Operating Company (AIOC), which was the country's first PSA, began production in 1997; AIOC comprised State Oil Company of Azerbaijan (SOCAR) and 9 major international oil companies. AIOC was developing three offshore fields [Azeri, Chirag, and the deepwater portions of Guneshli (ACG)]; total reserves were estimated to be 4.3 billion barrels (Gbbl) (about 585 Mt) of oil. Since November 1997, almost all the country's increases in oil production have come from AIOC. From November 1997 through yearend 2001, AIOC had produced a total of 133.5 million barrels (about 18.2 Mt) of oil mostly from the Chirag-1 stationary platform. In the coming decade, increases in production were projected to come primarily from further development of these offshore fields (U.S. Energy Information Administration, 2002a§).

Azerbaijan failed to resolve disputes with Iran and Turkmenistan that concerned competing claims to the Khazar, Kyapaz-Serdar, and Osman fields in the Caspian Sea. In July 2001, tensions erupted in the South Caspian when a BP ship, which had been licensed to explore Azerbaijan's Alov, Araz, and Sharg concessions, was ordered to leave the area by an Iranian gunboat. Iran considered the area, which it calls Alborz, to be a part of the Iranian sector of the Caspian Sea (U.S. Energy Information Administration, 2002a§).

Azerbaijan's only oil export routes were the "northern" Baku-Novorossiysk pipeline route, which transported oil to Russia's Black Sea coast, and the "western" Baku-Sup'sa pipeline, which transported oil to Georgia's Black Sea coast. Oil refinery products were also exported by rail to Georgia's Black Sea ports (U.S. Energy Information Administration, 2002a§).

For Azerbaijan to increase its oil exports, it will need to construct new pipelines. Although several oil export pipelines from the Caspian Sea region have been under consideration, Azerbaijan has consistently supported the proposed Baku-Ceyhan pipeline "Main Export Pipeline," which would export oil from Azerbaijan and possibly Kazakhstan along a 2,253-km route from Baku via Georgia to the Turkish Mediterranean port of Ceyhan, thereby bypassing the Bosphorus Straits (U.S. Energy Information Administration, 2002a§).

Azerbaijan's crude oil was refined domestically at two refineries—the Azerineftyag (Baku) refinery, which had a capacity of 230,000 barrels per day (bbl/d), and the Azerneftyanajag (New Baku) refinery, which had a capacity of 212,000 bbl/d. Both refineries needed modernization. The U.S. Trade and Development Agency was financing a $600,000 feasibility study for upgrading the two refineries and the specialized oil port of Dubandi (U.S. Energy Information Administration, 2002a§).

Kazakhstan.—Following Russia, Kazakhstan was the second largest oil-producing country in the FSU. Kazakhstan has proven petroleum reserves that were estimated to be 5.4 Gbbl (about 735 Mt). In addition, Kazakhstan's onshore and offshore petroleum resources are estimated to be from 30 to more than 50 Gbbl (about 4.1 to 6.8 Gt), which far exceeded its proven reserves. The giant Kashagana offshore field alone could contain up to 50 Gbbl (6.8 Gt) of oil (U.S. Energy Information Administration, 2002b§).

Output increased by more than 12% in 2001 to 39.7 Mt from 35.3 Mt in 2000. A number of major oil fields, which included Ayrankul, Chinarevskoye, North Buzachi, Sazankuark, and Saztyube, recently came onstream. Such fields as Alibekmola, Kozhasay, and Urikhtau, were set to begin producing in the near future. Kazakhstan could significantly increase its oil production in the coming decade; oil production was expected to reach 1.2 Mbbl/d (almost 60 Mt/yr) in 2005, 2 million bbl/d (almost 100 Mt/yr) by 2010, and up to 2.5 Mbbl/d (almost 125 Mt/yr) by 2015 (U.S. Energy Information Administration, 2002b§).

Kazakhstan's economic growth during the past 3 years has been based on increased oil exports and the fiscal policies and economic initiatives instituted in 1999. Foreign investment in the country's oil industry was one of the main factors responsible for Kazakhstan's economic growth. Since achieving independence in 1991, Kazakhstan has received approximately $13 billion in foreign investment in its oil and natural gas industries (U.S. Energy Information Administration, 2002b§).

International projects included joint ventures with Kazakhstan's national oil company Kazmunaigaz (formerly Kazakoil) and PSAs and exploration/field concessions. Large foreign investment in Kazakhstan's oil sector since 1991 enabled the country to increase its oil production to 39.7 Mt in 2001 from 25.8 Mt in 1992 (U.S. Energy Information Administration, 2002b§).

Most of the increase in output will come from three enormous fields—Karachaganak, Kashagana, and Tengiz. ChevronTexaco Corp. was a partner with Kazakhstan in the Tengizchevoil joint venture to develop the Tengiz field, which has 6 to 9 Gbbl (816 Mt to 1.2 Gt) of estimated oil reserves. Production at Tengiz has increased to about 250,000 bbl/d (12.5 Mt/yr) by mid-2002 from 25,000 bbl/d (1.25 Mt/yr) in 1993. ChevronTexaco planned to increase production to 400,000 bbl/d (almost 20 Mt/yr) by 2005, and if adequate export routes are developed, then the joint venture could reach peak production of 750,000 bbl/d (about 37 Mt/yr) by 2010 (U.S. Energy Information Administration, 2002b§).

Karachaganak Integrated Organization (KIO), which was a consortium led by BP and Agip (Italy), was developing the

Karachaganak field. The field had estimated reserves of 2.3 Gbbl (313 Mt) of oil and gas condensate and about 453 billion cubic meters (16 trillion cubic feet) of natural gas. Development at Karachaganak has focused on producing gas condensate (U.S. Energy Information Administration, 2002b§).

Preliminary drilling results indicated that the offshore Kashagana field had huge reserves. The field was being claimed as the largest oil discovery in the world in the past 30 years. In February 2001, Italy's ENI (Agip's parent company) won a contested battle among partners in the Offshore Kazakhstan International Operating Company (OKIOC) to be the operator for the Kashagana field. Subsequently OKIOC was renamed Agip Kazakhstan North Caspian Operating Company (Agip KCO) (U.S. Energy Information Administration, 2002b§).

In March, Agip KCO discovered oil at the Kashagana West 1 well, which is located about 40 km from the first drilled oil well (Kashagana East 1). Agip KCO released estimates that the Kashagana field, which includes the West 1 and East 1 wells, could hold between 7 and 9 Gbbl (950 Mt to more than 1.2 Gt) of proven oil reserves. The field has been conservatively estimated to hold an additional 38 Gbbl (5.2 Gt) in resources. The first stage of development, which was planned for 2005, was expected to produce 100,000 bbl/d. With further development of this field, Kazakhstan will become one of the five leading oil producers in the world. Before this, however, Kazakhstan needed to resolve major issues that involved its ownership rights to Caspian offshore fields and to establish export routes for its oil (U.S. Energy Information Administration, 2002b§).

Development of offshore resources in the Caspian Sea has been slowed by the ongoing dispute among the littoral states over ownership rights. The disagreement involved a debate that concerned how the sea should be treated under international law and whether the littoral states should share the Caspian Sea's resources in common or if each state should establish its own zone of ownership and, if so, how to delineate these zones. Kazakhstan has signed bilateral agreements with Azerbaijan, Russia, and Turkmenistan and pledged to divide their sections of the Caspian Sea along median lines; however, disputed claims of ownership between Azerbaijan and Iran and Azerbaijan and Turkmenistan have heightened tensions in this region (U.S. Energy Information Administration, 2002b§).

Developing export routes for bringing landlocked Kazakhstan's oil to world markets has been the other major issue. Thus far, Kazakhstan's oil has been exported through the Russian pipeline system. Lack of other export routes has hindered a further growth in exports. In March 2001, with the launch of the approximately 1,593-km Caspian Pipeline Consortium (CPC) pipeline, Kazakhstan took a major step towards increasing its oil exporting potential. The 1.34-Mbbl/d-capacity pipeline will enable Kazakhstan to pipe its oil directly from the Tengiz field to Russia's Black Sea port of Novorossiysk. The pipeline was officially opened on November 27, 2001.

Besides the CPC pipeline, a number of additional oil-export pipeline routes from the Caspian Sea region were under consideration or under development. Kazakhstan had expressed support for the Baku-Ceyhan Main Export Pipeline, but had not officially pledged to use the pipeline, thus not foreclosing any export options (U.S. Energy Information Administration, 2002b§).

Kazakhstan had three major oil refineries—in the northern region at Pavlodar, in the western region at Atyrau, and in the southern region at Shymkent. Their combined total refining capacity was 427,000 bbl/d (U.S. Energy Information Administration, 2002b§).

Russia.—Russia was one of the world's leading oil producers. Russia's oil production increased by 7.4% to 348 Mt in 2001 from 324 Mt in 2000. In February 2002, its oil production surpassed that of Saudi Arabia for the first time since the Soviet era and made Russia, at least temporarily, the world's leading oil producer. Russia had the world's eighth largest oil reserves; proven oil reserves were 48.6 Gbbl (about 6.6 Gt). Because of aging equipment and poorly developed fields, Russia was finding it difficult to develop its reserves. Russia's rate of oil production exceeded its rate of discovery of new reserves by a significant margin. To sustain and increase its oil production from 2001 levels will require large amounts of capital to develop new fields and to extend the life of existing oilfields with exhausted and low-yield reserves (U.S. Energy Information Administration, 2002c§).

A major restructuring of Russia's oil sector, which involved decentralization, began in 1992; privatization of Russian oil assets began in 1995. Hundreds of new participants have entered the oil sector at all levels of production and trade to form diverse types of enterprises, which included private, cooperative, municipal, public, joint stock, joint venture, and foreign owned. Still, fewer than one dozen major vertically integrated companies (VICs), which were mostly privatized oil companies formed between 1992 and 1998, controlled the majority of the Russian oil industry (Khartukov, 2002).

These VICs consisted of private companies, government-owned entities, and regional oil companies. The five largest VICs—OAO Lukoil, OAO Yukus, Siberian Oil Co., Surgutneftegaz (OAO SNG), and Tyumen Co.—were privately owned with, at most, symbolic state participation and operated nationally and, at times, internationally. The Government-owned major companies were represented by the 100% state-owned Rosneft and the Russian-Belarusian state-controlled Transneft, which almost fully monopolized crude oil pipeline shipments, and the 75% state-controlled Transnefteprodukt, which monopolized control of oil product shipments. On a regional level, the two major large, but not fully integrated enterprises, Baskir Fuel Co. and Tatneft, operated in the republics of Bashkortostan and Tatarstan, respectively, in the Volga-Urals region. Although these two companies were partly privatized, they were virtually controlled by the republic governments (Khartukov, 2002).

A number of other oil companies could fit into these categories of private, state-owned, and regional, but they would not qualify as major oil companies. The major Russian oil companies can be compared with major foreign firms in terms of production and reserves, but not in terms of capitalization. The shareholding structure of private oil companies was obscure with an interconnected network of wealthy Russian financiers, oil-related investment firms, and commercial banks that appeared to control these companies (Khartukov, 2002).

The sharp increase in oil prices in 1999 and 2000 provided Russian oil companies with revenues to upgrade infrastructure and to undertake new exploratory drilling. Besides further developing oil fields in the West Siberia region where, as of 2001, most of the country's oil was produced, Russian oil producers were engaged in exploring the Russian sector of the Caspian Sea and uniting with foreign oil producers to develop oil projects in the Arctic region, eastern Siberia, and Sakhalin Island in the Russian Far East (U.S. Energy Information Administration, 2002c§). Foreign companies that were considering new investments in Russia were asking, however, for protection against unexpected changes in tax and regulatory policies as a precondition for investing in Russia (Herrick, Barrionuevo, and Whalen, 2002).

Besides being one of the world's leading oil producers, Russia was also one of the world's largest oil exporters. In 2001, its net oil exports were increased to 4.91 Mbbl/d (about 244 Mt), which made Russia the world's second largest oil exporter after Saudi Arabia. The decline in world oil prices in 2001 slowed Russia's economic recovery, which had been driven, in part, by high world oil prices in 1999 and 2000. The fall in world oil prices after September 11, 2001, resulted in members of OPEC requesting Russia and other non-OPEC members to reduce their oil exports to increase prices. In December 2001, Russia agreed to cut its oil exports by 150,000 bbl/d during the first half of 2002. Russia's state budget for 2002 was to be based on an average oil price of $23 per barrel and a minimum price of $18 per barrel (U.S. Energy Information Administration, 2002c§).

Despite Russia's pledge to reduce its oil exports by 150,000 bbl/d in the first half of 2002, Russian oil production was still forecast to post a 1.9% year-on-year increase in 2002. Although Russian Government officials pledged to limit the country's oil exports, new export routes, such as the Baltic Pipeline System, have provided a disincentive for Russian oil producers to reduce their output. Russia's oil exports could be higher if more pipeline export capacity was added. Many of Russia's oil pipelines were in disrepair; however, the country's main export pipeline, which was the 1.2-Mbbl/d-capacity Druzhba pipeline, was operating at close to capacity (U.S. Energy Information Administration, 2002c§).

With the increase in revenues from oil exports in recent years, Transneft took steps to upgrade the country's pipeline system. Transneft emphasized building new export pipelines to increase and diversify export routes for oil exporters. It constructed the new Baltic Pipeline System and was considering a possible pipeline to China (U.S. Energy Information Administration, 2002c§).

Russia had 42 oil refineries that had a total processing capacity of 6.9 Mbbl/d. Many of these refineries were in need of modernization. Refining capacity far exceeded the domestic demand for refined products of 2.38 Mbbl/d in 2001 (U.S. Energy Information Administration, 2002c§).

Turkmenistan.—Turkmenistan had 546 Mbbl (more than 74 Mt) of proven oil reserves and had resources of up to 1.7 Gbbl (about 231 Mt) mainly in offshore areas of the Caspian Sea and in the western part of the country. The country's oil production rapidly increased to 156,400 bbl/d (almost 7.8 Mt) in 1999 from 81,000 bbl/d (4 Mt) in 1995, but the rate of increase has greatly slowed since then; Turkmenistan produced 159,000 bbl/d (about 7.9 Mt) in 2001 and consumed 52,000 bbl/d (about 2.6 Mt). The state oil company Turkmenneft produced approximately 90% of this total; the remainder was produced by the state natural gas company Turkmengaz and several foreign oil companies that operated under PSAs (U.S. Energy Information Administration, 2002d§).

In the first 4 months of 2002, Turkmenistan was striving to increase its oil output to 200,000 bbl/d (more than 9.9 Mt) from additional production from newly developed wells in the western part of the country. In accord with a 10-year program, Turkmenistan planned to raise its oil production to almost 1 Mbbl/d (almost 50 Mt/yr) by 2010. To achieve this target, Turkmenistan will need $25 billion in foreign investment in its oil and natural gas sectors between 2002 and 2010. Projects that could substantially increase Turkmenistan's oil production, however, have stalled owing to problems with Government regulations, which included regulations that impeded exports. Because foreign investors do not have access to export pipelines that were controlled by state-owned firms, they were forced to sell the oil and natural gas they produced through the state commodities exchange or to send it to refineries. Oil and natural gas, however, were sold in Turkmenistan at fixed prices that were well below world market levels. Turkmenistan was making an effort to draft legislation that will expand opportunities for foreign investors to export oil and natural gas and that will include liberalizing pipeline transport, which could include easing access and reducing costs, and easing tax burdens (U.S. Energy Information Administration, 2002d§).

Turkmenistan had two refineries—the 120,500-bbl/d refinery at Seydi and the 116,500-bbl/d refinery at Turkmenbashy. Both facilities were slated for modernization and expansion to meet the country's expected increases in oil production and demand. In 2001, work on modernization was underway with financing from German and Japanese sources. French and Iranian firms have been engaged in modernization projects. France's Technip was awarded a contract to build a lubricants-blending plant scheduled for completion in 2004 (U.S. Energy Information Administration, 2002d§).

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TABLE 1
COMMONWEALTH OF INDEPENDENT STATES: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity	1997	1998	1999	2000	2001 p/
ARMENIA					
Metals:					
Copper:					
Concentrate, Cu content	9,000 e/	9,200 e/	9,600 e/	7,231 3/	7,056
Blister	5,000	3,000	5,000 e/	4,000	4,000
Gold e/ kilograms	500	350	400	400	400
Molybdenum, concentrate, Mo content	1,800 e/	2,500 e/	2,800 r/	6,044 r/	5,770
Rhenium (supply) e/ kilograms	NA	1,000	700	700	750
Silver do.	1,000	1,000	1,200 e/	1,300 e/	1,300 e/
Zinc, concentrate, Zn content	830 e/	825 e/	879	528	745
Industrial minerals:					
Cement thousand tons	297	300	287	219	276
Clays, bentonite (powder)	2,750 e/	3,000 e/	3,493	2,807	3,000 e/
Limestone thousand tons	1,700	1,700	1,700 e/	12,800 r/	11,900
Perlite e/	6,000	35,000	35,000	35,000	35,000
Salt	26,000 e/	24,911	26,955	30,000	28,800
AZERBAIJAN 4/					
Metals:					
Aluminum:					
Alumina thousand tons	10 r/	(4/) r/	76	217 r/	95
Aluminum, primary	4,800	-- r/	-- r/	-- r/	--
Alunite	50,000	--	--	23,000 r/	NA
Iron ore, marketable e/	2,200	6,600	--	NA r/	NA
Steel:					
Crude	24,600	8,000 r/ e/	-- r/	-- r/	--
Rolled	20,000	3,000	-- r/	-- r/	--
Pipes	13,000	3,100	100	4,000 r/	1,600
Ingots and castings	NA	8,292	381	846	NA
Industrial minerals:					
Caustic soda	23,400	21,000	20,800	30,000 e/	30,000 e/
Cement	314,800	201,000	171,400	200,000	500,000
Iodine e/ kilograms	300,000	300,000	300,000	300,000	300,000
Fertilizers, mineral	5,700	600	40	NA	NA
Gypsum e/	60,000	60,000	60,000	60,000	60,000
Salt	2,500 e/	3,518	2,978	3,801	4,000 e/
Sulfuric acid	52,500	24,000	24,000	24,000 e/	24,000 e/
Mineral fuels and related materials:					
Natural gas thousand cubic meters	5,963,900	5,590,000	6,000,000	5,600,000	5,500,000
Natural gas plant liquids thousand 42-gallon barrels	2,555	2,555	2,555	2,190 r/	NA
Petroleum, crude thousand metric tons	9,027	11,420	13,800	14,100	14,900
BELARUS					
Metals, steel:					
Crude thousand tons	1,220	1,412	1,449	1,623	1,852
Rolled do.	1,072	1,250	1,300	1,400	1,500
Pipes	30,700	47,200	33,100 r/	37,000 r/	42,800
Industrial minerals:					
Cement thousand tons	1,876	2,035	2,100 r/	1,847	1,803
Nitrogen, N content of ammonia do.	590 e/	685	765	730	725
Potash, K_2O equivalent do.	3,247	3,451	4,553	3,786	4,495
Salt 5/	297,100	355,200	344,318	310,741	301,000
Sulfur e/	20,000	20,000	20,000	20,000	20,000
Sulfuric acid thousand tons	698	640	650 e/	650 e/	650 e/
Mineral fuels and related materials:					
Natural gas million cubic meters	246	252	256	257	255
Peat:					
Horticultural use	253,000	99,000	100,000 e/	100,000 e/	100,000 e/
Fuel use	2,768,000	2,035,000	3,090,000	3,786,000 r/	4,495,000
Total	3,021,000	2,134,000	3,190,000	3,886,000 r/	4,595,000
Petroleum:					
Crude thousand tons	1,822	1,830	1,840	1,851 r/	1,852
Refined do.	11,900	11,539 r/	11,486 r/	13,528 r/	13,346

See footnotes at end of table.

TABLE 1--Continued
COMMONWEALTH OF INDEPENDENT STATES: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity	1997	1998	1999	2000	2001 p/
GEORGIA					
Metals:					
Copper, mine output, Cu content e/	4,100 3/	6,000	7,000 r/	8,000	8,000
Gold kilograms	700 e/	700 e/	2,043	2,924	2,000 e/
Iron and steel:					
Ferroalloys, electric furnace: e/					
Ferromanganese	4,000	10,000	6,500 r/	7,000 r/	7,000
Silicomanganese	16,600	35,000	25,000 r/	25,000 r/	25,000
Total	20,600	45,000	31,500 r/	32,000 r/	32,000
Steel:					
Crude	104,242	56,400 r/	7,000 r/	49,500	50,000
Finished products, rolled	86,700 r/	42,700 r/	7,200 r/	1,000	1,000 e/
Lead, mine e/	200	200	200	200	200
Manganese ore, marketable	14,200 r/	16,000 r/	47,900	59,100	70,000 e/
Silver kilograms	NA	NA	29,487	33,884	33,000 e/
Zinc, mine output, Zn content e/	200	200	200	200	200
Industrial minerals:					
Barite e/	20,000	20,000	15,000	15,000	15,000
Cement	90,600	200,000	342,200	347,700	300,000
Clays, bentonite	12,000	11,000 e/	9,891	7,084	7,000 e/
Nitrogen, N content of ammonia	84,000	64,000	104,000	135,000	60,000
Zeolites	6,000	NA	NA	NA	NA
Mineral fuels and related materials:					
Coal, bituminous	5,443 r/	13,608 r/	16,329 r/	19,958 r/	4,000
Natural gas thousand cubic meters	NA	NA	NA	1,000 r/	400
Petroleum:					
Crude	143,000	119,200	91,300	109,500	100,000
Refined	30,400 r/	53,100 r/	56,500	24,500	NA
KAZAKHSTAN					
Metals:					
Alumina thousand tons	1,095	1,085	1,158	1,217	1,220
Bauxite	3,380,000 r/ e/	3,436,800	3,606,500	3,729,600	3,667,700
Arsenic trioxide e/	1,500	1,500	1,500	1,500	1,500
Beryllium, metal e/	100	100	100 r/	100 r/	100
Bismuth, metal e/	50	50	55	55	130
Cadmium, metal	745	1,622	1,246	257	170
Chromite	1,795,900 r/	1,602,700	2,405,600	2,606,600	2,045,800
Cobalt, mine output, Co content e/	300	300	300	300	300
Copper:					
Mine output, Cu content	316,166	337,600 r/	374,000 r/ e/	430,000 r/	470,100
Metal:					
Smelter, undifferentiated	327,397 r/	351,336 r/	383,457	413,859	430,000 e/
Refined, primary	301,100 r/	324,900	361,889 r/	394,722 r/	421,800
Gold:					
Mine output, Cu content kilograms	18,700 e/	18,100 e/	20,236	28,171	27,100
Metal, refined do.	9,700 e/	8,900	9,655	11,529	16,569
Iron and steel:					
Iron ore, marketable thousand metric tons	12,600 r/	8,693	9,091 r/	16,160 r/	14,140
Metal:					
Pig iron	3,040,000	2,594,000	3,438,082	4,000,000 r/	3,911,000
Ferroalloys:					
Ferrochromium	600,000	535,000	731,563	799,762	761,900
Ferrochromiumsilicon	48,000 e/	33,550	49,282	55,634	79,800
Ferromanganese	-- r/	-- r/	--	1,075 r/	5,329
Ferrosilicon	133,000 e/	92,000 e/	140,263	133,269	145,800
Silicomanganese	55,000 e/	57,000 e/	78,495	102,719	141,200
Other	9,000	8,000	9,000 e/	9,000 e/	9,000 e/
Total	845,000 r/	725,550 r/	1,008,603	1,101,459 r/	1,143,029
Steel:					
Crude	3,900,000	3,089,000	4,116,000 r/	4,770,000 r/	4,693,900
Finished, rolled	3,000,000	2,519,000	3,186,000	3,700,000	3,700,000

See footnotes at end of table.

TABLE 1--Continued
COMMONWEALTH OF INDEPENDENT STATES: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity	1997	1998	1999	2000	2001 p/
KAZAKHSTAN--Continued					
Metals--Continued:					
Lead:					
Mine output, Pb content	31,000 r/ e/	30,000	34,100 r/ e/	40,000 r/ e/	37,700
Metal, smelter, primary and secondary	81,974	118,632	160,000 e/	185,800	158,800
Magnesium	8,972	9,000 e/	11,031	10,380	16,000 e/
Manganese ore:					
Crude	400,000	634,100	980,000 r/	1,136,000 r/	1,403,000
Marketable	230,000 e/	399,000	563,000	720,000	646,700
Molybdenum, mine output, Mo content	100 e/	100 e/	155	215	225 e/
Nickel, mine output, Ni content e/	-- r/	--	--	30 r/	3,200
Rhenium (supply) e/ kilograms	1,800	2,400	2,400	2,400	2,500
Silver:					
Mine output, Ag content	690,000	726,321	904,644	927,110	981,900
Metal, refined	390,000 e/	535,800	654,606	670,000	700,000
Tin, mine output, Sn content	NA	NA	119,643	218,863	219,000 e/
Titanium, metal	13,000 e/	12,000 e/	8,767	8,280	14,000
Vanadium, mine output, V content e/	900	1,000	1,000	1,000	1,000
Zinc:					
Mine output, Zn content	224,051	224,300	288,300 r/	325,000 r/	344,300
Metal, smelter, primary and secondary	188,996	240,728	249,327	262,200 r/	276,900
Industrial minerals:					
Asbestos, all grades	182,000	155,400	139,300	233,200	271,300
Barite, concentrate	38,000 r/ e/	9,000	13,300 r/	14,000 r/ e/	45,000 e/
Boron e/	30,000 r/	30,000 r/	30,000 r/	30,000 r/	30,000
Cement	661,000 e/	600,000 e/	837,800	1,175,000	1,957,000
Clay, kaolin e/	50,000	60,000	70,000	70,000	70,000
Nitrogen, N content of ammonia e/	75,000	--	--	--	--
Phosphate rock thousand tons	1,000 e/	100 e/	68	33	97
Sulfur, byproduct: e/					
Metallurgy	139,000	212,000	245,000	300,000	300,000
Natural gas and petroleum	778,000	933,000	1,070,000	1,200,000	1,400,000
Total	917,000	1,150,000	1,320,000	1,500,000	1,700,000
Mineral fuels and related materials:					
Coal thousand metric tons	72,600	69,800	58,378	74,872	79,000
Natural gas million cubic meters	8,100	7,900	9,946	11,542	11,600
Natural gas plant liquids thousand 42-gallon barrels	20,075	18,250	27,010	39,420 r/	NA
Petroleum, crude:					
Gravimetric units	25,800,000	25,900,000	30,100,000 r/	35,300,000 r/	39,700,000
Converted, volumetric units e/ thousand 42-gallon barrels	190,000	190,000	221,000 r/	260,000 r/	292,000
Refinery products	9,200,000	8,000,000 e/	7,205,000 r/	NA	NA
Uranium concentrate, U content	1,000	1,074	1,367	1,752 r/	2,018
KYRGYZSTAN					
Metals:					
Antimony:					
Mine output, Sb content e/	1,200 3/	150	100	150	150
Metal and compounds	4,401	1,298	1,320	1,505	1,200
Gold e/ kilograms	17,400 3/	22,000	20,000	22,000	24,000
Mercury:					
Mine output, Hg content e/	550	250	300	257	270
Metal	610 e/	620	620 r/	550 r/	579
Molybdenum	NA	225 e/	250	250 e/	250 e/
Industrial minerals:					
Cement	658,000	709,400	386,300	500,000 r/	500,000
Fluorspar concentrate	4,176	3,200 e/	2,997	3,000 e/	1,175
Rare earths:					
Concentrate, gross weight	NA	8,590 e/	11,878	14,900 r/	7,700
Rare-earth oxide equivalent:					
Compounds kilograms	NA	691 r/	956 r/	NA r/	NA e/
Metals do.	NA	6,355 r/	5,159	7,736	3,800 e/

See footnotes at end of table.

TABLE 1--Continued

COMMONWEALTH OF INDEPENDENT STATES: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity	1997	1998	1999	2000	2001 p/
KYRGYZSTAN--Continued					
Mineral fuels and related materials:					
Coal	521,500	432,400	417,000	424,900	477,300
Natural gas million cubic meters	24	18	25	32	33
Petroleum, crude	84,800	78,300	77,000	77,100	75,500
MOLDOVA					
Metals, crude steel	810,000	718,000	796,000	909,000 r/	966,000
Industrial minerals:					
Cement	121,800	74,000	50,000	222,000	158,100
Gypsum	14,400	19,800	18,500	32,000 r/	55,200
Lime	9,900	12,700	5,200	3,100	3,200
Sand and gravel cubic meters	346,700	248,300	317,700	276,400 r/	306,600
Mineral fuels, peat e/	475,000	475,000	475,000	475,000	475,000
RUSSIA					
Metals:					
Aluminum:					
Ore and concentrate:					
Alumina thousand tons	2,400 e/	2,465	2,657	2,850 e/	3,050
Bauxite e/	3,350,000	3,450,000	3,750,000	4,200,000	4,000,000
Nepheline concentrate, 25% to 30%	940,000	889,000	772,000	814,000	960,000
Metal, smelter, primary	2,906,020	3,004,728	3,146,232	3,245,000	3,300,000 e/
Antimony, mine output, Sb content (recoverable) e/	6,000	4,000	4,000	4,500	4,500
Arsenic, white e/	1,500	1,500	1,500	1,500	1,500
Beryllium, beryl, cobbed, 10% to 20% BeO e/ 6/	1,000	1,000	1,000	1,000	1,000
Bismuth, mine output, Bi content e/	50	35	50	50	50
Cadmium metal, smelter e/	790	800	900	925 3/	950
Chromium, chrome ore, marketable	151,000 r/ e/	150,000 r/ e/	115,100 r/	92,000 r/ e/	69,926
Cobalt: e/					
Mine output, recoverable Co content	3,300	3,200	3,300	3,600	3,800
Metal, refined	4,100	3,500	3,600	4,400	5,000
Copper:					
Ore, Cu content, recoverable e/	505,000	500,000 3/	530,000	570,000	620,000 3/
Metal:					
Blister: e/					
Primary	535,000	510,000	540,000	580,000	600,000
Secondary	35,000	40,000	158,000	200,000	200,000
Total	570,000	550,000	698,000	780,000 3/	800,000
Refined:					
Primary	535,000	543,000	600,000	640,000 e/	650,000
Secondary	65,000	77,000	150,000	200,000 e/	244,500
Total	600,000	620,000	750,000	840,000 e/	894,500
Gold, mine output, Au content kilograms	124,000 e/	114,900	125,870	143,000	152,500
Iron and steel:					
Iron ore, 55% to 63% Fe	70,900,000	72,343,000	81,311,000	86,630,000	82,800,000 e/
Metal:					
Pig iron	37,327,000	34,827,000	40,854,200	44,618,100	44,980,000
Direct-reduced iron	1,730,000 e/	1,550,000	1,880,000	2,000,000 r/	1,900,000
Ferroalloys: e/					
Blast furnace:					
Ferromanganese	47,100 3/	65,000 3/	90,000	70,700	70,700
Ferrophosphorus	3,600 3/	3,500	3,500	3,500	3,500
Spiegeleisen	7,000	7,000	7,000	7,000	7,000
Electric furnace:					
Ferrochromium	247,000	203,000 3/	249,000 3/	274,000 3/	210,600 3/
Ferrochromiumsilicon	5,000	4,000	4,500	4,500	4,000
Ferronickel	40,000	30,000	33,000	35,000	30,000
Ferrosilicon	510,000	496,000 3/	601,000 3/	652,000 3/	707,100 3/
Silicon metal	40,000	40,000	40,000	40,000	40,000
Other	40,000	40,000	40,000	40,000	35,000
Total	940,000	889,000	1,070,000	1,130,000	1,110,000

See footnotes at end of table.

TABLE 1--Continued

COMMONWEALTH OF INDEPENDENT STATES: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity	1997	1998	1999	2000	2001 p/
RUSSIA--Continued					
Metals--Continued:					
Iron and steel--Continued:					
Metal--Continued:					
Steel:					
Crude	48,499,300	43,821,800	51,524,100	59,097,500	59,000,000
Finished, rolled	37,800,000	35,134,000	40,900,000	46,900,000	47,100,000
Pipe	3,500,000	2,816,000	3,004,000	4,385,000	5,010,000
Lead:					
Mine output, recoverable Pb content	16,000	13,000	13,000	13,300 e/	12,300 e/
Metal, refined, primary and secondary e/	52,000	36,000	62,000	59,000	67,500
Magnesium: e/					
Magnesite	1,040,000	851,845 3/	900,000	1,000,000	1,100,000
Metal, including secondary	39,500 3/	41,500 3/	45,000	45,000	45,000
Manganese, mine output, Mn content e/	21,000	21,000	22,000	23,000	23,000
Mercury e/	50	50	50	50	50
Molybdenum e/	2,000	2,000	2,400	2,400	2,600
Nickel: e/					
Mine output, recoverable Ni content	280,000 r/	290,000 r/	300,000 r/	315,000 r/	325,000
Matte	366	98	114	517	97
Nickel products:					
Ferronickel	8,000 r/	8,000 r/	9,000 r/	7,000 r/	8,000
Metal	208,000 r/	203,000 r/	215,000	225,000	230,000
Oxide sinter	12,000 r/	14,000 r/	12,000 r/	14,000 r/	12,000
Chemicals	2,000	2,000	2,000	2,000	2,000
Total	230,000	227,000	238,000	248,000	252,000
Platinum-group metals: e/					
Platinum	30,000 r/	30,000 r/	32,000 r/	35,000 r/	35,000
Palladium	70,000 r/	70,000 r/	75,000 r/	84,000 r/	72,000
Other	13,500 r/	13,500 r/	13,700 r/	14,100 r/	--
Total	114,000 r/	114,000 r/	121,000 r/	133,000 r/	107,000
Rhenium (supply) e/ kilograms	NA	900	1,100	1,100	1,200
Silver e/ do.	400,000	350,000	375,000	370,000	380,000
Tin: e/					
Mine output, recoverable Sn content	7,500	4,500	4,500	5,000	--
Metal, smelter:					
Primary	6,700	3,000	3,400	4,700	4,569 3/
Secondary	1,000	500	400	500	500
Total	7,700	3,500	3,800	5,200	5,069 3/
Titanium, sponge e/	21,000	22,000	22,000 r/	23,000 r/	23,000
Tungsten concentrate, W content e/	3,000	3,000	3,500	3,500	3,600
Vanadium metal e/	9,000	9,000	9,000	9,000	9,000
Zinc: e/					
Mine output, recoverable Zn content	121,000	115,000	132,000 3/	136,000 3/	124,000
Metal, smelter, primary and secondary	189,000	192,000	221,000	230,000	237,000
Zirconium, baddeleyite concentrate, averaging 98% ZrO_2	5,745	6,293	6,800	6,500 e/	6,500 e/
Industrial minerals:					
Asbestos, grades I-VI	710,000 e/	600,000 e/	675,000 r/	750,000 r/	750,000 e/
Barite e/	60,000	60,000	60,000	60,000	60,000
Boron e/	1,000,000 r/	1,000,000 r/	1,000,000 r/	1,000,000 r/	1,000,000
Cement, hydraulic	26,700,000	26,000,000	28,400,000 e/	32,400,000	35,100,000
Clays, kaolin (concentrate)	50,000	50,000	40,600	45,000	45,000 e/
Diamond: e/					
Gem thousand carats	11,200	11,600	11,500	11,600	11,600
Industrial do.	11,200	11,600 r/	11,500	11,600	11,600
Synthetic do.	80,000	80,000	80,000	80,000	80,000
Total do.	102,000	103,000 r/	103,000	103,000	103,000
Feldspar e/	45,000	40,000	45,000	45,000	45,000
Fluorspar, concentrate 55% to 96.4% CaF_2	6,200	120,200	153,800	187,600	190,000 e/
Graphite e/	6,000	6,000	6,000	6,000	6,000
Gypsum	559,000	609,400	650,000	700,000	700,000 e/
Iodine e/ kilograms	250,000	280,000	300,000	300,000	300,000

See footnotes at end of table.

TABLE 1--Continued
COMMONWEALTH OF INDEPENDENT STATES: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity		1997	1998	1999	2000	2001 p/
RUSSIA--Continued						
Industrial minerals--Continued:						
Lime, industrial and construction e/		7,626,000 3/	7,000,000	7,000,000	8,000,000	8,000,000
Lithium minerals, not further specified e/		2,000	2,000	2,000	2,000	2,000
Mica e/		100,000	100,000	100,000	100,000	100,000
Nitrogen, N content of ammonia		7,150,000	6,500,000	7,633,100	8,735,000	8,685,000
Peat, fuel use		3,363,000 r/	1,767,000 r/	3,350,000 r/	2,100,000 r/	2,100,000 e/
Phosphate rock: e/						
Gross weight		9,800,000	10,100,000	11,400,000	11,100,000	10,500,000
P2O5 content:						
Apatite concentrate, 37% to 39.6%		3,300,000	3,735,000 3/	4,161,000 3/	4,150,000 3/	3,900,000 3/
Sedimentary rock, 19% to 30%		300,000	300,000	300,000	300,000	300,000
Total		3,600,000	4,040,000	4,460,000	4,450,000	4,200,000
Potash, marketable, K2O equivalent e/		3,400,000	3,500,000	4,200,000	3,700,000	4,300,000
Salt, all types		2,100,000	2,200,000	3,200,000	3,200,000 e/	2,800,000 e/
Sodium compounds, n.e.s., carbonate		1,700,000	1,600,000 e/	NA	NA	2,370,000
Sulfur: e/						
Native		50,000	50,000	50,000	50,000	50,000
Pyrites		400,000	254,000	300,000	350,000	400,000
Byproduct, natural gas		2,950,000	3,940,000	4,410,000	4,900,000	5,300,000
Other		350,000	411,000	510,000	600,000	500,000
Total		3,750,000	4,660,000	5,270,000	5,900,000	6,250,000
Sulfuric acid		6,100,000	5,840,000	208,000	184,000	185,000
Talc e/		90,000	79,000	90,000	100,000	100,000
Vermiculite e/		25,000	25,000	25,000	25,000	25,000
Mineral fuels and related materials:						
Coal:						
Anthracite	thousand metric tons	13,600	10,400	9,900	1,050	NA
Bituminous	do.	146,400	142,700	155,800	172,060	NA
Lignite	do.	85,200	78,800	83,400	83,740	NA
Total 9/	do.	245,000	232,000	249,000	256,850	269,000
Coke, 6% moisture content		25,600,000	23,600,000	28,100,000 e/	60,000,000	60,000,000 e/
Gas, natural, marketed	million cubic meters	571,000	591,400	592,000	584,000	581,000
Natural gas plant liquids	42-gallon barrels	71,175,000	80,300,000	84,315,000	84,680,000 r/	86,505,000
Oil shale		2,000,000 e/	1,715,000	1,950,000 e/	1,676,000	NA
Petroleum:						
Crude in:						
Gravimetric units	thousand metric tons	306,000	303,300	305,000 e/	324,000 r/	348,000
Volumetric units e/	thousand 42-gallon barrels	2,250,000	2,230,000	2,240,000	2,390,000	2,560,000
Refinery products 7/	thousand metric tons	178,000	164,000	175,000 r/	174,000	178,362
Uranium concentrate, U content e/		2,000	2,000	2,000	2,000 r/	2,000
TAJIKISTAN 8/						
Metals:						
Aluminum, primary		206,400	196,300	229,100	300,000	289,000
Antimony, Sb content of concentrate e/		1,200 3/	1,500	1,800	2,000	2,500
Bismuth, mine e/		5	5	5	5	5
Gold	kilograms	2,550	3,000	2,700 e/	2,700 e/	2,700 e/
Lead, Pb content of concentrate e/		800	800	800	800	800
Mercury, Hg content of concentrate e/		40	35	35	40	40
Silver, Au content of concentrate	kilograms	NA	5,000	5,000 e/	5,000 e/	5,000 e/
Industrial minerals:						
Cement		36,400	17,700	30,000	50,000	70,000
Fluorspar e/		9,000	9,000	9,000	9,000	9,000
Gypsum e/		26,000	31,700	35,000	35,000	35,000
Nitrogen, N content of ammonia e/		10,000	10,000	10,000	10,000	10,000
Mineral fuels and related materials:						
Coal		17,000	16,000	16,600	20,700	20,000
Natural gas	thousand cubic meters	41,600	32,400	40,000	40,000	50,000
Petroleum, crude		26,000	19,400	20,000 e/	40,000 r/	50,000
TURKMENISTAN						
Industrial minerals:						
Bentonite e/		50,000	50,000	50,000	50,000	50,000
Bentonite powder e/		250 3/	250	250	250	250

See footnotes at end of table.

TABLE 1--Continued
COMMONWEALTH OF INDEPENDENT STATES: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity	1997	1998	1999	2000	2001 p/
TURKMENISTAN--Continued					
Industrial minerals--Continued:					
Bischofite e/	90 3/	90	100	100	100
Bromine e/ kilograms	130,000 3/	150,000	150,000	150,000	150,000
Cement e/	450,000	450,000	450,000	450,000	NA
Epsomite	NA	NA	NA	NA	NA
Ferrous bromide (51% Br) e/	83 3/	80	85	85	85
Gypsum e/	85,000	100,000	100,000	100,000	100,000
Iodine e/ kilograms	87,100 3/	90,000	150,000	150,000	150,000
Lime	16,000	15,000	16,000 e/	16,000 e/	16,000 e/
Nitrogen, N content of ammonia e/	60,700 3/	75,000	75,000	75,000	75,000
Salt e/	216,500 3/	215,000	215,000	215,000	215,000
Sodium sulfate e/	56,552 3/	55,000	60,000	60,000	60,000
Sulfur e/	9,227 3/	9,000	9,000	9,000	9,000
Mineral fuels and related materials:					
Natural gas million cubic meters	17,300	14,000 e/	22,800 e/	47,000	46,300
Natural gas plant liquids 42-gallon barrels	6,205,000	6,205,000	6,205,000	5,840,000 r/	NA
Petroleum, crude e/	4,700,000 3/	6,500,000	7,800,000	7,350,000	7,900,000
UKRAINE					
Metals:					
Alumina thousand tons	1,080 e/	1,291	1,230	1,360	1,370
Aluminum:					
Primary	100,500	106,700	115,425	119,290	121,034
Secondary	NA	71,164	110,940	128,952	130,000
Cadmium, metal e/	25	25	25	25	25
Germanium e/	22	22	22	NA	NA
Iron and steel:					
Iron ore, marketable	53,000,000 e/	50,758,000	47,769,100	55,883,200	54,650,000
Metal:					
Pig iron	20,561,000	20,840,000	21,937,000 r/	25,700,000 r/	26,400,000
Ferroalloys:					
Blast furnace:					
Ferromanganese	125,000 e/	112,400	57,800	85,400 e/	85,000 e/
Spiegeleisen e/	2,500	2,500	2,500 r/	5,400	5,000 e/
Electric furnace:					
Ferromanganese	160,000 e/	150,000 e/	199,539	252,679	250,000 e/
Ferrosilicon	300,000 e/	222,511	243,600	323,417	325,000 e/
Silicomanganese	560,000 e/	485,560	498,905	684,040	685,000 e/
Other e/	25,000	20,000	25,000	25,000	25,000 e/
Total	1,172,500	992,971	1,027,344	1,375,936	1,380,000 e/
Steel:					
Crude	25,600,000	23,461,000	27,390,000	31,780,000	33,110,000
Finished, rolled	19,525,000	17,776,000	19,300,000	22,500,000	25,300,000
Pipe	1,844,300	1,519,300	1,175,000	1,670,000	1,600,000
Lead, refined (secondary)	11,000 e/	9,000 e/	9,902	15,034	12,000 e/
Magnesium, primary	10,000 e/	5,043	3	3 r/ e/	3 e/
Manganese:					
Marketable ore	3,040,000	2,226,000	1,984,800	2,740,600	2,700,100
Mn content e/	1,030,000	755,000	675,000	930,000	930,000
Mercury e/	25	20	NA	NA	NA
Nickel, mine output, Ni content of ore	--	--	--	--	1,500
Silicon e/	1,000	1,000	1,000	NA	NA
Titanium:					
Ilmenite concentrate, 42% TiO	500,000 r/ e/	507,435	536,542	576,749	600,000 e/
Rutile concentrate, 95% TiO e/	50,000	50,000	49,000	58,600	60,000
Metal, sponge e/	1,200	4,000	4,000	4,000 r/	6,100
Zinc, metal, secondary e/	2,000	--	--	--	--
Industrial minerals:					
Bromine e/ thousand kilograms	3,000	3,000	3,000	3,000	3,000
Cement	5,098,000	5,591,200	5,828,100	5,311,400	5,500,000 e/
Clays: e/					
Bentonite	300,000	300,000	300,000	300,000	300,000
Kaolin	250,000	201,670 3/	221,526 3/	225,000	225,000

See footnotes at end of table.

TABLE 1--Continued
COMMONWEALTH OF INDEPENDENT STATES: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity	1997	1998	1999	2000	2001 p/
UKRAINE--Continued					
Industrial minerals--Continued:					
Diamond, synthetic e/ carats	8,000,000	8,000,000	8,000,000	8,000,000	8,000,000
Graphite	5,000 e/	5,104	7,461	7,431	7,500
Nitrogen, N content of ammonia	3,400,000 e/	3,300,000	3,711,000 r/	3,577,000 r/	3,700,000
Potash, K2O content e/	60,000 3/	35,000	50,000 r/	85,000 r/	75,000
Salt, rock	2,500,000 e/	2,500,000 e/	2,185,300	2,286,500	2,300,000
Soda ash e/	NA	390,000	460,000 3/	500,000	650,000
Sulfur, native	100,000	97,000	80,000 e/	80,000 e/	80,000
Zirconium concentrates e/	65,000	65,000	69,000	75,000	75,000
Mineral fuels and related materials:					
Coal:					
Hard thousand tons	NA	41,750	45,216	40,983	NA
Brown do.	NA	1,409	1,184	1,067	NA
Coking do.	NA	32,608	35,424	38,940	NA
Total do.	76,900	75,767	81,824	80,990	83,900
Coke	15,000,000 e/	13,956,700	17,309,700	19,362,600	19,500,000
Natural gas thousand cubic meters	18,131,000	17,967,000	18,092,100	17,847,100	18,200,000
Natural gas plant liquids 42-gallon barrels	9,490,000	9,125,000	8,395,000	5,110,000 r/	5,000,000
Peat e/	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
Petroleum:					
Crude:					
As reported gravimetric tons	4,131,200	3,894,800	3,797,900	3,692,900	3,700,000
Converted e/ 42-gallon barrels	30,400,000	28,600,000	27,900,000	27,200,000	27,200,000
Refinery products	12,833,000	13,510,000	13,800,000 r/	NA	NA
Uranium concentrate, U content e/	500	500	500	600 3/	500
UZBEKISTAN					
Metals:					
Aluminum, secondary	2,700	2,500 r/	1,900 r/	1,500 r/	3,000 e/
Copper:					
Mine output, Cu content	73,000 r/	65,000 r/	60,000 r/ e/	65,000 r/ e/	65,000 e/
Metal: e/					
Blister:					
Primary	80,000	89,930 3/	72,000	75,000	75,000
Secondary	5,000	5,000	5,000	5,000	5,000
Total	85,000	94,930 3/	77,000	80,000	80,000
Refined:					
Primary	105,000	89,930 3/	72,000	75,000	75,000
Secondary	5,000	5,000	5,000	5,000	5,000
Total	110,000	94,930 r/ 3/	77,000	80,000	80,000
Gold kilograms	81,700 e/	80,000	66,028	62,276	87,000 e/
Molybdenum, mine output, Mo content e/	500	500 r/	500 r/	500 r/	500
Rhenium (supply) e/ kilograms	NA	NA	NA	NA	NA
Silver, mine output do.	85,000 r/ e/	85,000 r/ e/	88,700	89,900	80,000 e/
Steel:					
Crude	365,000 r/	344,000	343,000 e/	420,000	460,000
Rolled	350,000	322,000	300,000	400,000	430,000
Tungsten, mine output, W content e/	250	200	--	--	--
Zinc, metal, smelter, primary e/	53,000	52,000	27,000	18,000	20,000
Industrial minerals:					
Cement	3,300,000	3,400,000 e/	4,471,000	3,521,000	4,000,000 e/
Clays, kaolin e/	5,500,000	5,500,000	5,500,000	5,333,000 3/	5,500,000
Feldspar	NA	NA	300	4,300	4,300 e/
Fluorspar	90,000 e/	80,000 e/	--	--	--
Graphite e/	60	60	60	60	60
Iodine e/ kilograms	--	500	2,000	2,000	2,000
Mineral fertilizers	955,000	976,000	900,000	800,000 r/	NA
Nitrogen, N content of ammonia	950,000	875,000	790,000	810,000	670,000
Phosphate rock, gross weight e/ thousand tons	--	100	150	300	300
Sulfur, byproduct: e/					
Metallurgy	165,000	170,000 3/	175,000	160,000 r/	160,000
Natural gas and petroleum	250,000	275,000 3/	280,000	285,000 r/	300,000
Total	415,000	445,000 3/	455,000	445,000 r/	460,000

See footnotes at end of table.

TABLE 1--Continued
COMMONWEALTH OF INDEPENDENT STATES: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity	1997	1998	1999	2000	2001 p/
UZBEKISTAN--Continued					
Mineral fuels and related materials:					
Coal	3,130,000	2,950,000	3,033,000	2,556,000	3,000,000
Natural gas million cubic meters	51,200	54,800	55,600	55,600	56,350
Natural gas plant liquids 42-gallon barrels	16,425,000	16,425,000	16,425,000	21,900,000 r/	NA
Petroleum and gas condensate	7,891,000	8,100,000	8,100,000	NA	7,450,000
Uranium, mine output, U content	1,764	2,000	2,159	2,350 r/	2,400

e/ Estimated. p/ Preliminary. r/ Revised. NA Not available. -- Zero.

1/ Estimated data are rounded to no more than three significant digits; may not add to totals shown.

2/ Table includes data available through November 2002.

3/ Reported figure.

4/ For some metals, including copper, gold, lead, molybdenum, silver, and zinc, and for a number of industrial minerals that Azerbaijan had produced, information was not sufficient to derive production estimates or to determine if production had ceased.

5/ Includes byproduct salt from potash production.

6/ It appears that Russia in the mid-1990s stopped mining beryllium ore. Beryllium ore was reportedly not produced in 1998.

7/ Not distributed by type and, therefore, not suitable for conversion to volumetric units. Data include all energy and nonenergy products but exclude losses.

8/ Tajikistan produces a number of other mineral commodities not listed in the table for which information is inadequate to derive estimates.

9/ Total coal production numbers rounded.

TABLE 2
COMMONWEALTH OF INDEPENDENT STATES: STRUCTURE OF THE MINERAL INDUSTRIES IN 2001 1/ 2/ 3/

(Metric tons unless otherwise specified)

Country and commodity	Major operating companies or deposits	Location or deposit name	Annual capacity e/
ARMENIA			
Aluminum, rolled and foil	Kanaker aluminum plant	K'anak'err	25,000
Copper:			
Mine output, Cu content	Facilities:		30,000 4/
	Agarak copper-molybdenum mining and processing complex	Agarak	
	Kapan mining directorate	Kapan	
	Zangezur copper-molybdenum complex mining Kadzharan deposit	Kadzharan	
	Not in operation:		
	Akht'ala mining directorate	Akht'ala	
	Shamlugh mining directorate	Shamlugh	
Blister	Manes and Vallex joint stock company	Alaverdi	15,000
Diamond, cut stones	Aghavni diamond-cutting works	Nor Geghi	NA
Do.	Amma group diamond-cutting works	Artashat	NA
Do.	Andranik diamond-cutting works	Nor Hachyn	NA
Do.	Diamond Company of Armenia (DCA)	Yerevan	NA
Do.	Lori diamond-cutting works	Nor Hachyn	NA
Do.	Lusampor	Melik'gyugh	NA
Do.	Punji diamond-cutting works	Yerevan	NA
Do.	Sapphire diamond-cutting works	Nor Hachyn	NA
Do. thousand carats	Shoghakan gem-cutting plant	do.	120
Gold kilograms	Zod mining complex (mining ceased in 1997)	Zod	2,000
Do. do.	Ararat gold processing-tailings recovery plant	Ararat	1,000
Do.	Megradzor deposit (mining ceased in 1997)	Megradzor	NA
Do.	Lichkvazkoye, Shaumyanskiy Rayon, Sotkskoye, Terterasarskoye deposits		NA
Iron ore	Hrazdan deposit	Sulagyan Mountains	NA
Molybdenum, mine output, Mo content	Zangezur copper-molybdenum complex, mining Kadzharan deposit	Kadzharan	20,400
Do.	Agarak copper-molybdenum mining and processing complex	Agarak	2,000
Perlite thousand tons	Aragats-Perlite mining and beneficiation complex	Aragats deposit	1,110
Zinc, mine output, Zn content	Kapan mining directorate	Kapan	NA

See footnotes at end of table.

TABLE 2--Continued
COMMONWEALTH OF INDEPENDENT STATES: STRUCTURE OF THE MINERAL INDUSTRIES IN 2001 1/ 2/ 3/

(Metric tons unless otherwise specified)

Country and commodity	Major operating companies or deposits	Location or deposit name	Annual capacity e/
AZERBAIJAN			
Aluminum thousand tons	Sumgait smelter	Sumqayit	100-150
Alumina	Gyandzha refinery	Ganca	100,000
Alunite ore	Zaglik alunite mining directorate	Zaglik	600,000
Arsenic		Dzhul'finskiy region	NA
Barite		Khanlarskiy region	NA
Cement			1,000,000 4/
	Karadagly cement plant	Karadagly	
	Tauz cement plant	Tauz region	
Clay, bentonite	Dash-Salakhlinskoye deposit	Kazakhskiy region	1,000,000
Copper	Karadaskiy complex	Shamkhorskiy region	30,000
Copper, byproduct gold and silver	Kedabekskiy Rayon deposit		NA
Copper, gold, iron, lead, sulfur, zinc	Katekhskoye, Katsdagskoye, Khikhinskoye deposits	Sheki-Belokanskiy zone, southern Caucasus	NA
Dolomite		Nakhichevan region	NA
Iodine and bromine	Baku, Karadagly, Neftechala plants	Process oil well brines at plants in Baku, Karadagly, Neftechala	NA
Iron ore, marketable	Dashkasan mining directorate	Dashkasan region	1,400,000
Lead-zinc ore		Ordubadskiy and Norashenskiy regions	NA
Limestone		Dashkasan region	NA
Molybdenum		Ordubadskiy region	NA
Natural gas, processing	Karadagly plant	Near Baku	NA
Petroleum and natural gas: 5/			
Crude petroleum and gas condensate	State Oil Company of Azerbaijan (SOCAR) for natural gas production	Production from 37 onshore deposits, including deposits on the Ashperon Peninsula and in the Izhnekurin Valley	3,000,000 4/
Do.	do.	Production from 17 offshore fields with more than 45% of natural gas produced from the Bakharly field and more than 50% of crude petroleum produced from the Guneshli field	12,000,000 4/
Do.	Azerbaijan International Operating Company (AIOC) for oil production	Azeri, Chirag-1, Guneshli offshore fields	7,000,000 4/
Do.	Alov, Araz, Khazar, Kyapaz-Serdar, Osman, Sharg offshore fields	Caspian Sea	NA
Natural gas million cubic meters			6,000 4/
	State Oil Company of Azerbaijan (SOCAR) for natural gas production	Production from 37 onshore deposits, which includes deposits on the Ashperon Peninsula and in the Izhnekurin Valley	
		Production from 17 offshore fields with more than 45% of natural gas produced from the Bakharly field and more than 50% of crude petroleum produced from the Guneshli field	
Do.	do.	Gunesli, Nakhchyvan, Shah-Deniz offshore fields	NA
Petroleum, refined 24-gallon barrels	Azernefteyag (formerly Baku) refinery	Baku	83,950,000 6/
Do. do.	Azernefteyagandzhah (formerly Novo-Baku) refinery	do.	77,380,000 6/
Pyrite, polymetallic		Filizchayskiy deposit	NA
Steel:			
Crude	Azerboru production amalgamation	Sumqayit	800,000
Rolled	do.	do.	700,000
Pipe, tubes	do.	do.	540,000
Stones, facing	Buzgovskiy and Shakhtakhtinskiy deposits		NA
Sulfur pyrites		Khanlarskiy region	NA
Travertine		Nakhichevan region	NA
BELARUS			
Cement	Krichevskiy and Volkovysk plants	Mahilyowskaya and Wawkavysk Voblasts'	2,200,000
Diamond	Kristall plant	Homyel'skaya Voblasts'	NA
Nitrogen, N content of ammonia	Grodno "Azot"+E148 Association	Hrodna region	1,000,000
Peat, fuel use	Production at 37 enterprises producing mainly briquets	All regions of country	5,000,000 7/

See footnotes at end of table.

TABLE 2--Continued
COMMONWEALTH OF INDEPENDENT STATES: STRUCTURE OF THE MINERAL INDUSTRIES IN 2001 1/ 2/ 3/

(Metric tons unless otherwise specified)

Country and commodity	Major operating companies or deposits	Location or deposit name	Annual capacity e/
BELARUS--Continued			
Petroleum:			
Crude	Belarusneft Association	Southeastern part of country	2,000,000
Refined	Mazyr refinery	Mazyr	16,000,000 8/
Do.	Naftan refinery	Navapolatsk	8,450,000 8/
Potash, K_2O equivalent	Belaruskaliy Association	Salihorsk area	5,000,000
Steel:			
Crude	Belarus electric steelworks	Zhlobin	1,400,000
Pipe	Mahilyow metallurgical works	Mahilyowskaya Voblasts'	80,000
GEORGIA			
Arsenic:			
As content of ore			2,000 4/
	Lukhumi deposit	Racha	
	Tsana deposit	Svanetiya	
Metal and compounds	Racha mining and chemical plant	Racha	NA
Do.	Tsana mining and chemical plant	Ts'ana	NA
Barite	Chordskoye deposit	Onis Raioni (Onskiy Rayon)	70,000
Do.	--	Madneuli deposit	NA
Barite-zinc	--	Kvaisinskiy deposit	NA
Bentonite	Gumbrskoye and Askanskoye deposits	Gumbra and Askana regions	200,000 4/
Cement	Rust'avi cement plant	Rust'avi	1,500,000
Coal	Tkibuli-Shaorskoye, Tkvarchelskoye deposits	Akhalts'ikhis Raioni, Tqibuli, Tqvrach'eli regions	300,000 4/
Copper, Cu content of ore	Madneuli complex	Marneulis Raioni	12,000
Diatomite	Kisatibskoye deposit	K'isat'ibi region	150,000
Ferroalloys:			
Ferromanganese	Zestafoni plant	Zestap'onis Raioni	100,000
Silicomanganese	do.	do.	250,000
Manganese sinter	do.	do.	250,000
Gold	Georgian-Austrian joint venture Quartzite	Madneuli deposit	3
Lead-zinc:			
Pb content of ore	Kvaisi deposit	Kvaisi	1,200
Zn content of ore	do.	do.	3,000
Manganese, marketable ore	Chiaturmarganets complex	Chiat'ura-Sach'kheris Raioni field	200,000
Petroleum:			
Crude	About 60 wells accounting for 98% of output	Mirzaani, Sup'sa, Zemo T'elet'i regions	200,000 4/
Refined	Batumi refinery	Bat'umi	NA
Steel, crude	Rust'avi steel mill	Rust'avi	1,400,000
KAZAKHSTAN			
Alumina	Pavlodar aluminum plant	Pavlodar	1,250,000
Arsenic trioxide	Chimkent polymetallic enterprise and other nonferrous metallurgical enterprises	Shymkent	3,500
Asbestos	Dzhetygara complex	Qostanay	1,000,000 4/
	Chilisay complex	Aqtobe phosphorite basin	
Barite			300,000 4/
	Karagaylinskiy and Zhayrem mining and beneficiation complexes	Karagayly and Zhayrem deposits	
	Tujuk Mine	Almaty	
	Achisay polymetallic complex	Kentau region	
Bauxite	Turgayskiy and Krasnooktyabrskiy bauxite mining complexes	Central Kazakhstan	4,000,000
Beryllium, metal	Ul'ba metallurgical plant	Oskemen	NA
Bismuth, metal			70 4/
	Ust-Kamenogorsk lead-zinc metallurgical plant	Oskemen	
	Leninogorsk lead smelter	Leninogorsk	
Do.	Chimkent refinery	Shymkent	20
Cadmium	do.	do.	10
Do.	Leninogorsk mining and beneficiation complex	Leninogorsk	1,200
Chromite, mine output:			
Cr_2O_3 content (50.3%)	Donskoy GOK mining and beneficiation complex	Near Khromtau, Kempirsai region	5,000,000
Cr_2O_3 content (50%)	do.	Ten Years of Independence Mine	4,000,000
Coal	Karaganda Basin	Central and north-central parts of the country	50,000,000
Do.	Ekibastuz Basin	do.	85,000,000

See footnotes at end of table.

TABLE 2--Continued

COMMONWEALTH OF INDEPENDENT STATES: STRUCTURE OF THE MINERAL INDUSTRIES IN 2001 1/ 2/ 3/

(Metric tons unless otherwise specified)

Country and commodity	Major operating companies or deposits	Location or deposit name	Annual capacity e/
KAZAKHSTAN--Continued			
Coal--Continued:	Maykuben Basin	do.	10,000,000
Do.	Turgay Basin	Central and north-central parts of the country	1,000,000
Copper:			
Mining, recoverable, Cu content	Irtysh	Ertis region	10,000
Do.	Leninogorsk	Leninogorsk region	15,000
Do.	Zyryanovsk mining and beneficiation complexes	Zyryanovsk region	5,000
Do.	Kazakhmys (OJSC) Balkhash mining and metallurgical complex	Zhezkazgan region	200,000
Mining, recoverable, Cu content--	Kazakhmys (OJSC) East Kazakhstan copper-chemical complex	East Kazakhstan region	12,000
Do.	Kazakhmys (OJSC) Zhezkent mining and metallurgical enterprise	Zhezkent region	25,000
Do.	Kazakhmys (OJSC) Zhezkazgan mining and metallurgical enterprise	Zhezkazgan region	250,000
Mining, gross weight of ore	Kazakhmys (OJSC) deposits:		37,400,000 4/
	Jalimambet, Kounrad, Sayak-1, Tastau, Zhezkazgan, Zhilandy	Central Kazakhstan	
	Shatyrkol' (Cu-Mo)	Southern Kazakhstan	
	Artemovskoye, Belousovskoye-Irtyshskoe, Nikolayevskoe, Orlovskoye, Shemonaikhinkoe, Yubileynoye-Snigirikhaskoe	Eastern Kazakhstan	
Do.	Kazakhmys (OJSC) Annenskiy mine	Annenskiy deposit	4,000,000
Do.	Kazakhmys (OJSC) 73/75 mine		2,000,000
Do.	Kazakhmys (OJSC) Itauz open pit mine	Zhilandy deposit	2,000,000
Metal:			
Blister	Ust-Kamenogorsk plant	Oskemen	37,100
	Kazakhmys (OJSC):		
Cathode	Balkhash mining and metallurgical complex	Zhezkazgan region	110,000
Do.	Zhezkazgan mining and metallurgical enterprise	do.	250,000
Metallurgy	Balkhash mining and metallurgical complex	do.	150,000
Do.	Zhezkazgan mining and metallurgical enterprise	do.	250,000
Do.	Irtysh smelting and refining complex	Ertis region	40,000
Refined	Ust-Kamenogorsk plant	Oskemen	6,600
Ferroalloys:			
Ferrochrome:			
High-carbon 60%	Aktybinsk plant	Aqtobe	200,000
Medium-carbon 60%	do.	do.	200,000
Do.	Aksu plant	Aksu	200,000
Ferrosilicon	do.	do.	700,000
Ferrosilicochrome	do.	do.	700,000
Ferrochrome, high-carbon	do.	do.	500,000
Silicomanganese	do.	do.	90,000
Gallium	Pavlodar aluminum plant	Pavlodar	NA
Gold	Byproduct of polymetallic ores and native gold mining	Byproduct gold colocated with nonferrous metals mining	30
Iron and steel:			
Pig iron	Ispat-Karmet Steelworks	Karaganda	5,000,000
Steel, crude	do.	do.	6,300,000
Iron ore, marketable	Lisakovskiy and Sokolovsko-Sarbay mining and metallurgical complexes	Qostanay	25,000,000
Lead:			
Mining, recoverable Pb content of ore	Achisay	Karatau and Kentau regions	40,000 4/
Do.	Akchatau	Zhezkazgan region	10,000
Do.	Irtysh	Oskemen region	10,000
Do.	East Kazakhstan copper-chemical complex	East Kazakhstan region	NA
	KazZinc subsidiaries:		
Do.	Leninogorsk mining-metallurgical complex	Leninogorsk region	60,000
Do.	Tekeli lead-zinc mining complex	Taldyqorghan and Tekeli regions	15,000 4/
Do.	Zyryanovsk lead-zinc complex	Zyryanovsk region	20,000
Do.	Karagayly	Karagayly region	20,000

See footnotes at end of table.

TABLE 2--Continued
COMMONWEALTH OF INDEPENDENT STATES: STRUCTURE OF THE MINERAL INDUSTRIES IN 2001 1/ 2/ 3/

(Metric tons unless otherwise specified)

Country and commodity	Major operating companies or deposits	Location or deposit name	Annual capacity e/
KAZAKHSTAN--Continued			
Lead--Continued:			
Mining, recoverable Pb content of ore--Continued:	Sary-Arkapolimetal	Zhayrang region	20,000
Do.	Zhezkent	Semey region	NA
Refined	KazZinc Ust-Kamenogorsk metallurgical plant	Oskemen	145,000
Do.	KazZinc Leninogorsk mining-metallurgical comple	Leninogorsk region	30,000
Do.	Chimkent refinery	Shymkent	160,000
Magnesium, metal	Ust-Kamenogorsk titanium-magnesium plant	Oskemen	20,000
Manganese, crude ore			2,550,000 4/
	Atasurda	Atasu	
	Kazakmarganets	Zhezdy	
	Sary-Arkapolimetal	Zhayrang region	
Molybdenum:			
Metal	Akchatau molybdenum metal plant	Zhezkazgan region	NA
Mining, recoverable content of ore			6,000 4/
	Balkhash complex	Kounrad Mine	
	Karaobinskoye deposit	Karaoba region	
	Sayak deposit	Sayaq (Sayak) region	
Natural gas million cubic meters			12,000 4/
	Aktyubinskmunaigaz	Aqtobe	
	Embamunaigaz	Emba District	
	Huricane Kumkol Munai	Aral Sea region	
	Karachaganak field	Northwestern Kazakhstan	
	Mangistaumunaigaz	Mangghhyshlaq Peninsula	
	Tengizchevroil joint venture	Tengiz deposit	
		Zhanazhol deposit	
		Urikhtau deposit	
	Agip Kazakhstan North Caspian Operating Company (AGip KCO)	Kashagana offshore field	
	Uzenmunaigaz	Uzen deposit	
Petroleum:			
Crude			32,000,000 4/
	Aktyubinskmunaigaz	Aqtobe	
	Embamunaigaz	Emba District	
	Huricane Kumkol Munai	Aral Sea region	
	Karachaganak Integrated Organization (KIO)	Karachaganak field	
	Mangistaumunaigaz	Mangghhyshlaq Peninsula	
	Uzenmunaigaz	Uzen deposit	
Do.	Alibekmola, Ayrankul, Chinarevskoye, Kozhasay, North Buzachi, Sazankurak, Saztyube, Urikhtau deposits		NA
Do. 24-gallon barrels per day	Tengizchevroil joint venture	Tengiz deposit (peak production by 2010)	750,000
Do. do.	Agip Kazakhstan North Caspian Operating Company (AGip KCO)	Kashagana offshore field	100,000
Refined, crude oil throughput do.	Atyrau Pavlodar, Shymkent refineries	Atyrau, Pavlodar, Shymkent	427,000 4/
Phosphate rock	Chilisay mining directorate	Aqtobe phosphorite basin	10,000,000 4/
	Karatau production association	Shymkent and Zhambyl regions	
Rare metals [columbium (niobium), indium, selenium, tellurium]	Aktau complex	Aktau	NA
Do.	Belogorsky rare metals plant	Belogorskiy	NA
Do.	Chimkent polymetallic plant	Shymkent	NA
Do.	Ust-Kamenogorsk lead-zinc plant	Oskemen	NA
Do.	Akchatau mining and beneficiation complex	Zhezkazgan region	NA
Rhenium	Balkhash copper mining-metallurgical complex	Zhezkazgan region	NA
Silver, refined			800 4/
	Chimkent metallurgical plants	Shymkent	
	Leninogorsk	Leninogorsk	
	Ust-Kamenogorsk	Zhezkazgan region	
Tantalum	Yermak ferroalloy plant	Aksu	NA
Tin	Akchatau mining and beneficiation complex	Akzhaik deposit, Zhezkazgan region	700

See footnotes at end of table.

TABLE 2--Continued
COMMONWEALTH OF INDEPENDENT STATES: STRUCTURE OF THE MINERAL INDUSTRIES IN 2001 1/ 2/ 3/

(Metric tons unless otherwise specified)

Country and commodity	Major operating companies or deposits	Location or deposit name	Annual capacity e/
KAZAKHSTAN--Continued			
Titanium, metal	Ust-Kamenogorsk titanium-magnesium plant	Oskemen	35,000
Uranium, U content			3,500 4/
	Prikaspiskiy ore enrichment center	Aqtau	
	Shevchenko	do.	
	Stepnogorsk	Stepnogorsk	
	Taboshara	Taboshara	
	Tselinny chemical complex	Stepnogorsk	
Zinc:			
Concentrates	Kazakhmys (OJSC) East Kazakhstan copper-chemical complex	East Kazakhstan region	50,000
Do.	Kazakhmys (OJSC) Zhezkent mining and metallurgical enterprise	Zhezkent region	25,000
Metal	KazZinc Ust'-Kamenogorsk metallurgical plant	Oskemen	160,000 9/
Do.	KazZinc Leninogorsk mining and metallurgical complex	Leninogorsk	107,000 9/
Ore	Tishinskiy deposit		NA
Do.	(KazZinc) Tekeli lead-zinc mining complex	Taldyqorghan and Tekeli regions	30,000 4/
KYRGYZSTAN			
Antimony:			
Sb content of ore	Kadamzhai and Khaidarkan complexes	Kadamzhaiskiy Rayon, Khaidarkan region	2,400 4/
Ore	Kadamzhai beneficiation plant	Kadamzhai deposit	200,000
Do.	Terek-Sayskiy beneficiation plant	Terek-Sayskiy deposit	60,000
Metal and compounds	Kadamzhai metallurgical facility	Kadamzhaiskiy Rayon	28,000
Antimony-fluorspar-mercury	Khaidarkan mining and metallurgical complex	Chauvi-Chonkoy-Khaidarkan deposit	NA
Cement	Kantskiy cement plant	Kant	1,500,000
Coal	Seven underground mines, five open pits, includes deposits: Almalyk, Dzhergalan, Kara-Kiche, Kok-Yangak, Kyzyl-Kiya, Sulyukta, Tashkumyr	Southwestern, central, and northeastern parts of the country	2,200,000 4/
Fluorspar, concentrate	Khaidarkan mining and metallurgical complex	Khaidarkan deposit	5,000
Gold:			
Au content of ore	Makmalzoloto	Makmal deposit	3
Do.	Kumtor Gold Company	Kumtor deposit	22
Do. kilograms	Solton-Sary Mine	Naryn	500
Do.	Taldybulak Levoberezhny deposit		NA
Au content of ore, open pit	Kyrgyzaltyn-Noroks Mining Company JV	Dzher-Uy deposit	650,000
Au content of ore, underground	do.	do.	350,000
Refined	Kara-Balta refinery	Chuskaya Oblast'	22
Mercury:			
Hg content of ore	Khaidarkan mining and metallurgical complex	Bol'shoy Khaidarkan, Chauvi, Chonkoy, Khaidarkan, Novoye deposits	700 4/
Metal	do.	do.	1,000
Molybdenum, for nonmetallurgical uses	Molibden Joint Stock Company	Chuskaya Oblast'	NA
Do.	Kara Balta mining and metallurgical complex		
Natural gas million cubic meters	Kyrgyzazmunayzat	Approximately 300 wells; Changyr-Tash, Chigirchik Pereval, Izbaskentskoye, Kara-Agach, Mayluu-Suu, Susahoye, Togap-Beshkenskoye deposits (major)	100 4/
Petroleum	do.	do.	150,000
Rare earths:			
Cerium and yttrium	Aktyuzskiy mining directorate	Kutessai II deposit	NA
Concentrates, gross weight	Kyrgyz chemical and metallurgical plant	Aktyuz-Boordu deposit	14,000
Compounds and metals, rare-earth oxide equivalent	do.	Orlovka	8,000
Silver	Kumyshtag deposit	Talasskaya Oblast'	NA
Do.	Karagoyskoye deposit	Oshskaya Oblast'	NA
Tin	Uchkoshkon deposit	Sary-Dzhas field	NA
Do.	Tyan'Shan'olovo mining-beneficiation complex	do.	NA
Do.	Enil'chek JSC mining enterprise	Atdzhaylau deposit	150
Do.	do.	Trudovoye deposit	350
Do.	Enil'chek JSC, Kyrgyzaltyn, Deputatskiy mining and beneficiation complex	do.	149,100

See footnotes at end of table.

TABLE 2--Continued
COMMONWEALTH OF INDEPENDENT STATES: STRUCTURE OF THE MINERAL INDUSTRIES IN 2001 1/ 2/ 3/

(Metric tons unless otherwise specified)

Country and commodity	Major operating companies or deposits	Location or deposit name	Annual capacity e/
KYRGYZSTAN--Continued			
Tungsten	Enil'chek JSC, Kyrgyzaltyn, Deputatskiy mining and beneficiation complex	Trudovoye deposit	149,100
Do.	Enil'chek JSC mining enterprise	Atdzhaylau deposit	90
Do.	do.	Trudovoye deposit	120
Uranium oxide, processed	Kara-Balta mining and metallurgical complex	Chuskaya Oblast'	1,200
MOLDOVA			
Natural gas thousand cubic meters	Redeco Moldova oil and gas company	Victorovca gas field	5,000
Oil	do.	Valeni oil field	100,000
Steel, crude	Moldova Steel Works minimill	Ribnita, Transnistria region	1,000,000
RUSSIA			
Alumina	Achinsk	Achinsk in East Siberia	900,000
Do.	Bogoslovsk	Ural'skiye Gory	1,050,000
Do.	Boksitogorsk	European north	200,000
Do.	Nadvoitsy	Nadvoitsy in Karelia	266,000
Do.	Uralsk	Kamensk region	536,000
Do.	Volkhov	Volkhov, east of St. Petersburg	45,000
Aluminum, primary smelters	Bogoslovsk	Krasnotur'insk	175,000
Do.	Bratsk	Bratsk	950,000
Do.	Irkutsk	Irkutskaya Oblast'	300,000
Do.	Kandalaksha	Kola Pennisula	75,000
Do.	Krasnoyarsk	Krasnoyarskiy Kray	875,000
Do.	Nadvoitsy	Nadvoitsy in Karelia	75,000
Do.	Novokuznetsk	Novokuznetsk	300,000
Do.	Sayansk	Sayanogorsk	425,000
Do.	Uralsk	Kamensk	80,000
Do.	Volgogard	Volgogradskaya Oblast'	175,000
Do.	Volkhov	Volkhov, east of St. Petersburg	20,000
Antimony:			
Sb content of concentrate			6,000 4/
	Sarylakh deposit	Ust'-Nera region	
	Sentachan deposit	Northeastern Sakha (Yakutiya) Republic	
Compounds and metals	Ryazsvetmet plant	Ryazanskaya Oblast'	NA
Apatite, concentrate	Khibiny apatite asociation	Kola Peninsula	15,000,000
Do.	Kovdor iron ore mining association	do.	700,000
Asbestos	Kiyembay	Orenburgskaya Oblast'	500,000
Do.	Tuvaasbest	Tuva Autonomous region	250,000
Do.	Uralaasbest	Central Urals	1,100,000
Bauxite	North-Urals mining company	Severoural'sk region	NA
Do.	South-Urals mining company	South Urals	NA
Do.	Severnaya Onega Mine	Northwest region	800,000
Boron, boric acid	Bor Association	Maritime Territory	140,000
Do.	Amur River complex	Far East	8,000
Do.	Alga River chemical complex	do.	12,000
Chromite	Saranov complex	Saranovskiy	200,000
Coal	Donets (east) Basin	Rostovskaya Oblast'	30,000,000
Do.	Kansk Achinsk Basin	East Siberia	50,000,000
Do. thousand tons	Kuzntesk Basin (Kuzbass)	West Siberia	160,000
Do.	Moscow Basin	Moscow region	15,000,000
Do.	Neryungri Basin	Sakha (Yakutiya) Republic	15,000,000
Do.	Pechora Basin	Komi Republic	30,000,000
Do.	South Yakutia Basin	Sakha (Yakutiya) Republic	17,000,000
Cobalt:	Noril'sk Nickel	Noril'sk, Kola Peninsula	4,000
Do	Rezh and Yuzhuralnikel enterprises	South Urals	2,100
Do.	Ufaleynikel company	Chelyabinsk region, Urals	1,900
Do.	Tuva cobalt	Khovu-Aksy, Tuva Autonomous region	NA
Copper:			
Concentrate, Cu content	Buribai enterprise	Buribay region	5,000
Do.	Gai complex	Gai region	40,000
Do.	Kirovgrad complex	Kirovgrad region	12,000
Do.	Krasnoural'skiy complex	Krasnoural'skiy region	12,000
Do.	Noril'sk complex	Noril'sk region, Kola Peninsula	400,000

See footnotes at end of table.

TABLE 2--Continued
COMMONWEALTH OF INDEPENDENT STATES: STRUCTURE OF THE MINERAL INDUSTRIES IN 2001 1/ 2/ 3/

(Metric tons unless otherwise specified)

Country and commodity	Major operating companies or deposits	Location or deposit name	Annual capacity e/
RUSSIA--Continued			
Copper--Continued:			
Concentrate, Cu content--Continued:	Urap complex	Stavropol'skiy Kray	7,000
Do.	Sredneuralsk complex	Ekatrinenburg region	12,000
Do.	Uchali complex	Uchalinskiy Rayon	40,000
Metal	Kirovgrad (smelting)	Kirovgrad	150,000
Do.	Krasnoural'skiy (smelting)	Krasnoural'sk	60,000
Do.	Kyshtym (refining)	Kyshtym	70,000
Do.	Mednogorsk (smelting)	Mednogorsk	40,000
Do.	Noril'sk (smelting and refining)	Nori'lsk	500,000
Do.	Psysh (refining)	Psysh	350,000
Do.	Severonikel (smelting)	Monchegorsk	20,000
Do.	Sredneuiralsk (smelting)	Revda	140,000
Ore	Noril'sk Polar Division	Oktyabr'skiy deposit, East Siberia	1,600,000
Do.	Molodezhnyy, Sibay, Uchali open pits	Urals	NA
Do.	Mednogorsk complex	Aleksandrinskoye deposit	NA
Do.	Gai complex	Letneye deposit	NA
Do.	Rezh nickel plant	Safyanovoskoye deposit	NA
Do.	Udokan deposit	Chita Oblast	10,000,000
Diamond:			
Gem thousand carats	Almazy Rossii-Sakha Association (ALROSA) Udachnyy mining and beneficiation enetrprise	Zarnitsa and Udachnyy Mines	NA
Do. do.	ALROSA Mirny mining and beneficiation	Mir and International Mines	NA
Do. do.	ALROSA Aikhal mining and beneficiation	Aikhal and Komsomol'skiy Mines	NA
Do. do.	ALROSA Anabaraskiy mining and beneficiation	Alluvial mines	NA
Do. do.	ALROSA Nyurbinskiy mining and beneficiation	Nyurbinskiy and Botuobinskiy Mines	NA
Industrial do.	ALROSA	Aykhal, Mirnyy, Udachnaya areas of Sakha (Yakutiy Republic; Mir, Komsomol'skaya, Verkne-Modunskoye pipes; Lomonosov in Arkhangel'skaya Oblast'	12,000 4/
Feldspar	Kheto-Lanbino and Lupikko deposits	Karelia	NA
Ferroalloys	Kosaya Gora iron works	Kosaya,Gora	200,000
Do.	Kuznetsk ferroalloys plant	Novokuznetsk	400,000
Do.	Lipetsk iron and steel works	Lipetskaya Oblast'	NA
Do.	Serov ferroalloy plant	Serov	NA
Do.	Chelyabinsk electrometallurgical plant	Chelyabinskaya Oblast'	450,000
Do.	Chusovoy iron and steel plant	Chusovoy	NA
Do.	Klyuchevsk ferroalloy plant	Dvurechensk	160,000
Ferronickel	Ufaleynikel company	Chelyabinsk region, Urals	5,000
Ferrovanadium	Vanadii-Tulachermet	Tula, North Caucasus	NA
Fluorspar	Abagaytuy deposit	Transbaikal	NA
Do.	Usugli mine	do.	NA
Do.	Kyakhtinsky deposit	do.	NA
Do.	Kalanguy mining complex	Chita region, Transbaikal	NA
Do.	Yaroslavsky mining and beneficiation complex	Pogranichnoye and Vosnesenskoye deposits, Russian Far East maritime (Primor'ye) region	NA
Gold kilograms	Mining regions:		200,000 4/
	Buryat	Buryatiya Republic	
	Irkutsk (Lenzoloto Gold Company)		
	Krasnoyarsk (Polius Gold Company)	Krasnoyarskiy Kray (Olimpiady deposit)	
	Magadan (Omolon Gold Company)	Magadanskaya Oblast'	
	Maritime	Maritime Territory	
	Tuva	Tuva Autonomous region	
	Yakut-Sakha	Sakha (Yakutiya) Republic	
Iron ore	Kursk Magnetic Anomaly (KMA):		50,000,000 4/
	Lebedi and Stoilo	Gubkin	
	Mikhailovka	Zheleznogorsk	
Do.	Northwest:		22,000,000 4/
	Kostomuksha	Kostomuksha	
	Kovdor	Kola Peninsula	
	Olenegorsk	Olenegorsk	

See footnotes at end of table.

TABLE 2--Continued
COMMONWEALTH OF INDEPENDENT STATES: STRUCTURE OF THE MINERAL INDUSTRIES IN 2001 1/ 2/ 3/

(Metric tons unless otherwise specified)

Country and commodity	Major operating companies or deposits	Location or deposit name	Annual capacity e/
RUSSIA--Continued			
Iron ore--Continued:	Urals:		22,000,000 4/
	Akkermanovka	Novotroitsk	
	Bakal	Bakal	
	Goroblagodat	Kushva	
	Kachkanar	Kachkanar	
	Magnitogorsk	Magnitogorsk	
	Peshchanka	Rudnichnyy	
Do.	Siberia:		18,000,000 4/
	East:		
	Korshunovo	Zheleznogorsk	
	Rudnogorsk	Rudnogorsk	
	West:		
	Abakan	Abaza	
	Sheregesh	Sheregesh	
	Tashtagol	Tashtagol	
	Teya	Vershina Tei	
Lead, metal	Dalpolymetal lead smelter	Rudnaya in the Maritime District	20,000
Do.	Elektrozinc lead smelter	Vladikavkaz in North Caucasus	30,000
Lead-zinc:			
Lead, recoverable Pb content of ore	Altay mining and benefication complex	Altay mountains region, South Siberia	2,000
Do.	Dalpolymetal mining and benefication complex	Maritime Territory	20,000
Do.	Nerchinsk polymetallic complex	Chitinskaya Oblast'	7,000
Do.	Sadon lead-zinc complex	Severnaya Osetiya-Alaniya Republic	5,000
Do.	Salair mining and benefication complex	Kemerovo Oblast'	2,000
Zinc, recoverable Zn content of ore	Altay mining and benefication complex	Altay mountains region, South Siberia	1,000
Do.	Dalpolymetal mining and benefication complex	Maritime Territory	25,000
Do.	Nerchinsk polymetallic complex	Chitinskaya Oblast'	12,500
Do.	Sadon lead-zinc complex	Severnaya Osetiya-Alaniya Republic	14,000
Do.	Salair mining and benefication complex	Kemerovo Oblast'	10,500
Magnesite	Satka deposit	Chelyabinsk Oblast'	3,800,000
Magnesium, metal (for sale)	Avisma plant	Berezniki	22,000
Do.	Solikamsk plant	Solikamsk	21,500
Mica	Aldan	Sakha (Yakutiya) Republic	NA
Do.	Karel	Karelia	NA
Do.	Kovdor	Kola Peninsula	NA
Do.	Mam	Irkutsk complex	NA
Molybdenum	Dzhida tungsten-molybdenum mine	West Transbaikal	NA
Do.	Sorsk molybdenum mining enterprise	Sorsk region	NA
Do.	Tyrnyauz tungsten-molybdenum mine	North Caucasus	NA
Do.	Shakhtaminskoye molybdenum mining enterprise	Chitinskaya Oblast'	NA
Natural gas million cubic meters	Komi Republic	Komi Republic	8,000
Do. do.	Noril'sk area	Noril'sk area	5,500
Do. do.	North Caucasus	North Caucasus	6,000
Do. do.	Sakhalin	Far East	2,000
Do. do.	Tomsk Oblast	West Siberia	500
Do. do.	Tyumen Oblast including:	do.	575,000 4/
Do. do.	Medvezhye field	do.	(75,000)
Do. do.	Urengoi field	do.	(300,000)
Do. do.	Vyngapur field	do.	(17,000)
Do. do.	Yamburg field	do.	(170,000)
Do. do.	Bovanenko field	Yamal Peninsula	NA
Do. do.	Pestsovoyy field	Ob-Taz Gulf area	NA
Do. do.	Zapolyarnyy field	do.	NA
Do. do.	Schtokmanov field	Barents Sea	NA
Do. do.	Urals	Ural'skiye Gory	45,000
Do. do.	Volga	Volga region	6,000
Do. do.	Yakut-Sakha	Sakha (Yakutiya) Republic	1,500
Nepheline syenite	Apatite complex	Kola Pennisula	1,500,000
Do.	Kiya-Shaltyr Mine	Goryachegorsk region, east Siberia	NA

See footnotes at end of table.

TABLE 2--Continued
COMMONWEALTH OF INDEPENDENT STATES: STRUCTURE OF THE MINERAL INDUSTRIES IN 2001 1/ 2/ 3/

(Metric tons unless otherwise specified)

Country and commodity	Major operating companies or deposits	Location or deposit name	Annual capacity e/
RUSSIA--Continued			
Nickel:			
Metal:			
Smelting	Nori'lsk Nickel	Noril'sk	160,000
Do.	do.	Pechenga	50,000
Do.	do.	Monchegorsk	50,000
Refining	do.	do.	100,000
Do.	do.	do.	140,000
Nickel in products and in FeNi	Rezh, Ufaleynikel, Yuzhuralnikel enterprises	South Urals	65,000
Nickel in ore	Noril'sk Nickel Association	Noril'sk region, Kola Peninsula	300,000
Do.	Ufaleynikel company	Chelyabinsk region, Urals	17,000
Do.	Yuzhuralnikel company	South Urals	3,000
Oil shale	Leningradslanets Association	Slantsy region	5,000,000
Petroleum	East Siberia, Tomsk Oblast	Tomskaya Oblast'	11,000,000
Do.	European Russia, Astrakhan	North Caspian Sea basin	700,000
Do.	European Russia, Bashkortostan	Ural'skiye Gory	28,000,000
Do.	European Russia, Checheno-Ingush Republic	Southern Caucasus	4,500,000
Do.	European Russia, Dagestan	North Caucasus	700,000
Do.	European Russia, Kaliningrad Oblast	Baltic coast	1,800,000
Do.	European Russia, Komi Republic	Northwest	15,000,000
Do.	European Russia, Krasnodar Kray	North Caucasus	2,000,000
Do.	European Russia, Orenburg Oblast	Ural'skiye Gory	13,000,000
Do.	European Russia, Perm Oblast	do.	12,000,000
Do.	European Russia, Samara	Volga region	16,000,000
Do.	European Russia, Saratov Oblast	do.	1,500,000
Do.	European Russia, Stavropol Kray	North Caucasus	2,000,000
Do.	European Russia, Tatarstan	Volga region	40,000,000
Do.	European Russia, Udmurt Republic	Ural'skiye Gory	9,000,000
Do. thousand tons		Tyumenskaya Oblast', West Siberia	300,000 4/
Do. do.	Kogolym field	do.	(34,000)
Do. do.	Krasnoleninskiy field	do.	(12,000)
Do. do.	Langepas field	do.	(30,000)
Do. do.	Megion field	do.	(18,000)
Do. do.	Nizhnevartovsk field	do.	(70,000)
Do. do.	Noyabrsk field	do.	(37,000)
Do. do.	Purneftegaz field	do.	(12,000)
Do. do.	Surgat field	do.	(48,000)
Do. do.	Uray field	do.	(8,000)
Do. do.	Varegan field	do.	(10,000)
Do.	Sakhalin Island	Sakhalin Island	2,500,000
Phosphate rock	Kingisepp complex	Leningradskaya Oblast'	NA
Do.	Lopatino, Yegorevsk deposits	Moscow Oblast'	NA
Do.	Polpinskoye deposit	Bryanskaya Oblast'	NA
Do.	Verkhnekamsk deposit	Ural'skiye Gory	NA
Phosphate rock, apatite concentrate	Khibiny Apatit Association	Kola Peninsula	20,000,000
Do.	Kovdor iron mining complex	do.	700,000
Platinum-group metals:			
Ore	Nori'lsk Nickel	Polar Division, Siberian deposits:	
Do.	do.	Noril'sk	135
Do.	do.	Oktyabr'skiy and Talnakh	NA
Do.	AO Koryakgeoldobycha, Amur Prospectors	Placer deposits (mostly platinum), Urals, Siberia, Russian Far East	10 4/
Metals	Krasnoyarsk Nonferrous Metals Plant	Krasnoyarskiy Kray	NA
Do.	Ekaterinburgskiy plant (EZOTsM)	Ekaterinburg	NA
Do.	Priobsk plant	Priobsk	NA
Potash, K2O equivalent	Uralkaliy	Verkhnekamsk deposit	3,000,000
Do.	Silvinit	Solikamsk-Berezniki regions, Ural'skiye Gory	2,000,000
Silver	Dukat Mine 10/	Magadanskaya Oblast'	1,000
Soda ash	Achinsk plant	East Siberia	595
Do.	Achinsk plant	East Siberia	595
Do.	Berezniki plant	Ural'skiye Gory	1,080
Do.	Pikalevo plant	Leningradskaya Oblast'	200

See footnotes at end of table.

TABLE 2--Continued
COMMONWEALTH OF INDEPENDENT STATES: STRUCTURE OF THE MINERAL INDUSTRIES IN 2001 1/ 2/ 3/

(Metric tons unless otherwise specified)

Country and commodity	Major operating companies or deposits	Location or deposit name	Annual capacity e/
RUSSIA--Continued			
Soda ash--Continued:	Sterlitamak plant	Sterlitamak	2,135
Do.	Volkhov plant	Leningradskaya Oblast'	20
Steel, crude	Amurstal	Komsomol'sk-na-Amure	1,600,000
Do.	Asha	Asha	450,000
Do.	Beloretsk	Bashkirskoye	380,000
Do.	Chusovoy	Chusovoy	570,000
Do.	Elektrostal	Moscow	314,000
Do.	Gorky	Nizhniy Novgorod	78,000
Do.	Gur'yevsk	Gur'yevsk	160,000
Do.	Karaganda	Karaganda	6,300,000
Do.	Lipetsk	Lipetskaya Oblast'	9,900,000
Do.	Lys'va	Lys'va	350,000
Do.	Magnitogorsk	Magnitogorsk	16,200,000
Do.	Mechel (Chelyabinsk)	Chelyabinskaya Oblast'	7,000,000
Do.	Nizhniy Tagil	Nizhniy Tagil	8,000,000
Do.	Nizhniy Sergi	Nizhniye Sergi	300,000
Do.	Nosta (Orsk-Kahlilovo)	Novotroitsk in Orenburgskaya Oblast'	4,600,000
Do.	Novosibirsk	Novosibirskaya Oblast'	1,100,000
Do.	Omutninsk	Omutninsk	210,000
Do.	Oskol Electric Steel	Staryy Oskol	2,500,000
Do.	Petrovsk-Zabaykal'skiy	Petrovsk-Zabaykal'skiy	426,000
Do.	Revda	Revda	281,000
Do.	Salda	Sverdlovskaya Oblast'	1,900
Do.	Serov A.K.	Serov	1,000,000
Do.	Serp i Molot	Moscow	70,000
Do.	Severskiy	Polevskoy in Sverdlovskaya Oblast'	825,000
Do.	Severstal (Cherepovets)	Cherepovets	14,000,000
Do.	Sibelektrostal	Krasnoyarskiy Kray	110,000
Do.	Sulin	Sulin	280,000
Do	Taganrog	Taganrog	925,000
Do.	Tulachermet Scientific and Industrial Association	Tula	18,400
Do.	Verkh-Isetskiy	Ekatrinenburg	132,000
Do.	Volgograd	Volgogradskaya Oblast'	2,000,000
Do.	Vyksa	Vyksa	540,000
Do.	West Siberian	Novokuznetsk	6,900,000
Do.	Zlatoust	Zlatoust in Chelyabinskaya Oblast'	1,200,000
Do.	Kuznetsk	Novokuznetsk	4,700,000
Talc	Onotsk deposit	Irkutskaya Oblast'	NA
Do.	Kirgiteysk deposit	Krasnoyarskiy Kray	NA
Do.	Miass deposit	Chelyabinskaya Oblast'	NA
Do.	Shabrovsk deposit	Sverdlovskaya Oblast'	NA
Tin:			
Ore	Novosibirsk Khinganskoye olovo (Jewish Autonomous District) mining-beneficiation complex	Khabarovskiy Kray	NA
Do.	Novosibirsk Dalolovo mining-beneficiation compl	Solnechnyy deposit, Primor'ye	NA
Do.	Novosibirsk Deputatskiy olovo mining-beneficiatic complex	Sakha (Yakutiya) Republic	NA
Do.	Iultin mining and beneficiation complex	Magadanskaya Oblast'	NA
Do.	Khrustalnyy mining and beneficiation complex	Maritime Territory	NA
Do.	Pevek mining and beneficiation complex	Magadanskaya Oblast'	NA
Metal	Novosibirsk smelter	Novosibirskaya Oblast'	NA
Do.	Podol'sk smelter	Podol'sk	NA
Do.	Ryazan smelter	Ryazanskaya Oblast'	NA
Titanium:			
Metal	Berezniki plant	Berezniki	40,000
Do	Moscow plant	Moscow	NA
Do.	Podol'sk plant	Podol'sk	NA
Products, areospace-engineering	Verknyaya Salda Metallurgical Production Association (VSMPO)	Sverdlovskaya Oblast', Urals	NA
Sponge	Avisma Titanium-Magnesium complex		NA

See footnotes at end of table.

TABLE 2--Continued
COMMONWEALTH OF INDEPENDENT STATES: STRUCTURE OF THE MINERAL INDUSTRIES IN 2001 1/ 2/ 3/

(Metric tons unless otherwise specified)

Country and commodity	Major operating companies or deposits	Location or deposit name	Annual capacity e/
RUSSIA--Continued			
Tungsten:			
Concentrates, W content	Aginskoye deposit	Sakha (Yakutiya) Republic	NA
Do.	Antonovogorsk	East Transbaikal	NA
Do.	Balkan	Northeast of Magnitogorsk, Ural'skiye Gory	NA
Do.	Belukha	East Transbaikal	NA
Do.	Bom-Grokhom	West Transbaikal	NA
Do.	Dzhida	do.	NA
Do.	Iultin	Magadanskaya Oblast'	NA
Do.	Kti-Teberdaskoye deposit	North Caucasus	NA
Do.	Lermontov	Russian Far East	NA
Do.	Primor'ye	Russian Far East	NA
Do.	Solnechnyy	Southern Khabarovskiy Kray	NA
Do.	Tyrnyauz tungsten-molybdenum mining and processing complex	Kabardino-Balkariya, North Caucasus	NA
Metal, tungsten anhydride	Gidrometallurg plant	Nal'chik, North Caucasus	NA
Uranium, U content	Priargunskiy mining and chemical enterprise	Krasnokamensk	3,000
Vanadium:			
Metal	Chusovoy and Nizhniy Tagil plants	Ural'skiye Gory	17,000
Ore	Kachkanar iron mining complex	Ural'skiye Gory	NA
Pentoxide	Vanadii-Tulachermet	Tula, North Caucasus	NA
Zinc:			
Zn content of ore	Bashkir copper-zinc complex	Sibai in southern Urals	5,000
Do.	Buribai copper-zinc mining complex	Buribai in southern Urals	1,500
Do.	Gai copper-zinc mining-beneficiation complex	Gai in southern Urals	25,000
Do.	Kirovgrad copper enterprise	Kirovgrad in central Urals	1,200
Do.	Sredneuralsk copper complex	Revda in central Urals	5,000
Do.	Uchali copper-zinc mining and beneficiation complex	Uchalinskiy Rayon in southern Urals	90,000
Metal	Chelyabinsk electrolytic zinc plant	Chelyabinskaya Oblast'	200,000
Do.	Elektrozink plant	Vladikavkaz in North Caucasus	100,000
TAJIKISTAN			
Aluminum	Tajik aluminum plant (TadAZ)	Tursunzade	517,000
Antimony	Anzob mining and beneficiation complex	Dzhizhikrutskoye Sb-Hg deposit	700,000
Do.	Isfara hydrometallurgical plant	Isfara	500
Do.	Shing-Magianskiye deposit		NA
Antimony concentrates	Marguzor-Magianskiye alluvial deposits		NA
Arsenic	Mosrif deposit		NA
Bismuth	Leninabad mining and beneficiation complex	Yuzhno-Yangikanskiy deposit	25
Do.	Isfara hydrometallurgical plant	Isfara	500
Bismuth, copper, fluorspar, gold, silver, zinc (ore processing)	Adrasman mining and beneficiation complex	Kanimansurskoye deposit (mining ceased in 1997)	650,000 4/
Boron	Ak-Arkhar deposit	Badakhshan region	NA
Coal	Isfara hydrometallurgical plant	Isfara	300,000
Do.	Shurab brown coal	Shurab region	NA
Do.	Fan-Yagnob hard coal deposits	Pyandzh region	50,000
Copper-lead-zinc	Leninabad mining and beneficiation complex	Yuzhno-Yangikanskiy deposit	2,500
Dolomite	Yavan electrochemical complex	Pashkharvoskoye deposit	NA
Fluorspar, concentrate	Takob mining and beneficiation complex	Takob and Krasnye Kholmy deposits	60,000 4/
Gold kilograms	Tajikzoloto mining-beneficiation complex, Pamir Artel	Darvazy, Rankul placer deposits, placers in central and southern parts of country	5,000 4/
Do. do.	Zerafshan Gold Company	Dzhilau, Jilau, Taror deposits, Sughd Oblast'	2,500 4/
Do. do.	Darvaz joint venture	Yak-Suyskoye deposit, Khatlonskaya Oblast'	2,000
Do. do.	Aprelevka joint venture	Aprelevka deposit	200
Do. kilograms	Chore, Kum-Manor, Shahbas deposits	Zarashon Valley	NA
Do.	Vostokredmet refinery	Chkalovsk	NA
Gold, ore processing	Kansayskaya factory	Aprelevka, Burgunda, Kyzyl-Chek, Shkol'noye	165,000 4/
Lead-zinc	Kansayskoye mining complex	Kara-Mazar region	NA
Do.	Altyn-Topkan mining directorate	Altyn-Topkan deposit (mining ceased in 1997)	NA
Do.	do.	Pay Bulak deposit (mining ceased in 1997)	NA
Do.	Adrasman mining and beneficiation complex		
Do.	Takaeliyskiy metallurgical complex		

See footnotes at end of table.

TABLE 2--Continued
COMMONWEALTH OF INDEPENDENT STATES: STRUCTURE OF THE MINERAL INDUSTRIES IN 2001 1/ 2/ 3/

(Metric tons unless otherwise specified)

Country and commodity	Major operating companies or deposits	Location or deposit name	Annual capacity e/
TAJIKISTAN--Continued			
Limestone	Dushanbe cement complex	Kharangonskoye deposit	NA
Loam	do.	Varzobskoye Ushchel'ye deposit	NA
Marble	Dashtak deposit	Darvaz region	NA
Do.	Jilikul deposit	Pendzhikent region	NA
Do.	Dal'yan Bolo deposit	Shakhristanskiy region	NA
Mercury	Anzob mining and beneficiation complex	Dzhizhikrutskoye deposit	150
Natural gas and petroleum thousand cubic meters	Sixteen oil-gas deposits under exploration, includir Ayritanskoye, Madaniyatskoye, and Ravatskoye	Fergana depression	200,000 4/
Do. do.	Beshtentyakskoye, Kichik-Belskoye, Shaambary, Uzunkhorskoye deposits	Southern Tajik depression	200,000 4/
Salt	Yavan electrochemical complex	Tut-Bulakskoye deposit	NA
Do.	Voseyskiy plant	Khodzha-Muminskoye deposit	NA
Do.	Ashtskiy plant	Kamyshkurganskoye deposit	NA
Do.	Khoja-Sartez, Samanchi, Tanabchi deposits		NA
Silver	Adrasman mining and beneficiation complex	Bolshoy Kanimansur deposit	15,000
Strontium	Chaltash, Chikultan, Daudyr deposits	Khatlon region	180,000
Tin-tungsten	Tafkon deposit		NA
Tungsten, ore	Maykhura deposit	95 km of Dushanbe, central Tajikistan	150,000
Uranium, U content	Adrasman, Maylisu, Taboshar, Usugai deposits	Kara-Mazar region, northern Tajikistan	NA
Do.	Vostokredmet plant	Chkalovsk	NA
Vanadium, pentoxide	do.	do.	350,000
TURKMENISTAN			
Ammonia thousand tons	Maryazot Association	Mary region	400,000 9/
Argillite cubic meters	Keramzit plant	Yagmanskoye deposit	200,000 9/
Barite-witherite	Arpaklenskiy mining enterprise	Arpaklen deposit	10,000 9/
Do.	Kumytash deposit and other deposits		NA
Bischofite, epsomite, Galauber's salt, sea salt	Karabogazsulfate Association	Kara-Bogaz-Gol Lagoon, off the Caspian Sea	NA
Bromine	Cheleken plant	Cheleken region	4,740 9/
Do.	Nebitdag plant	Vyshka, Stantsiya	2,370 9/
Cement, from:			
Bench gravel and loam	Bezmeinskiy cement plant	Bezmeinskoye deposit	1,400,000
Limestone and clay	Kugitangskoye deposit		NA
Limestone and marl	Gingol'skoye deposit		NA
Clays:			
Bentonite	Oglanly Mine	Oglanly region	100,000 9/
Kaolin	Ashkhabad glass plant	Kyzylkainskoye deposit	80,000
Do.	Tuarkyrskoye deposit	250 kilometers southeast of Turkmenbashi	NA
Coal, oxidized	do.	do.	NA
Dolomite	Ashkhabad glass plant	Kelyatinskoye deposit	6,000
Gypsum	IA Turkmenmineral	Mukry, Tagorin deposits	300,000 9/
Do.	Wastes from Gaurdak sulfur deposit	Gaurdak, Gora	400,000 9/
Do.	Krasnovodsk Aylagy (anhydride) deposit	9 kilometers east of Turkmenbashi	160,000 9/
Iodine	Cheleken plant	Cheleken region	355 9/
Do.	Nebitdag plant	Vyshka, Stantsiya	255
Limestone	Gaurdak deposit	4 kilometers northeast of Gaurdak	NA
Do.	Kara-Dzhumalakskoye deposit	60 kilometers from Gaurdak	NA
Limestone, for facing materials	Charshanginskoye, Gaurdakskoye, Geok-Tepinskoye, Kaylyu, Krasnovodsk Aylagy (tuff and granite), Tyuzmergenskoye deposits		NA
Do. cubic meters	Tagarinskoye deposit	8 kilometers from Gaurdak	1,000
Limestone, for filing stone do.	Aeroport deposit	21 kilometers northeast of Turkmmenbashi	2,000 9/
Do. do.	Bekdashskoye deposit	200 kilometers north of Turkmmenbashi	5,000 9/
Do. do.	Dostluksoye deposit	230 kilometers southeast of Turkmenabat	2,000 9/
Do. do.	Mukrinskoye deposit	60 kilometers southwest of Gaurdak	25,000 9/
Natural gas million cubic meters	Achakskoye, Dauletabad, Donmez, Gygyrlinskoye, North and South Naipskiye, West Shatlykskiye, Yashlar deposits	Onshore in eastern and southwestern parts of country and offshore in Caspian Sea; Amu-Dar'ya and Murgab Basins; Dashoguzskiy, Lebapskiy, Maryyskiy deposits	90,000 4/
Ozokerite	Cheleken mining enterprise		NA

See footnotes at end of table.

TABLE 2--Continued
COMMONWEALTH OF INDEPENDENT STATES: STRUCTURE OF THE MINERAL INDUSTRIES IN 2001 1/ 2/ 3/

(Metric tons unless otherwise specified)

Country and commodity		Major operating companies or deposits	Location or deposit name	Annual capacity e/
TURKMENISTAN--Continued				
Petroleum:				
Crude		Barsa-Gelmesskoye, Burunskoye, Cheleken, Gograndagskoye, Kamyshldzhinskoye, Korturtepinskoye, Kum Dag, Kuydzhikskoye, Okaremskoye deposits	Onshore in southwestern part of country and offshore in the Caspian Sea	5,500,000 4/
Refined	24-gallon barrels per day	Chardzhouskiy Rayon refinery	Seydi, Chardzhouskiy Rayon	120,500
Do.	do.	Turkmenbashi refinery	Turkmenbashi	116,500
Pigment, natural		Bakhchesu/Cheshme/Gadyn deposit	28 kilometers southwest of Serdar	NA
Potash (sylvinite, carnallite)		Karlyuk deposit (experimental mine closed 1998)	25 kilometers from Gaurdak	NA
Do.		Karabil'skoye deposit	17 kilometers south of Gaurdak	NA
Quartz sand		Annauskoye, Babadurmazskoye, Bakhardenskoye deposits		NA
Rock salt		Gaurdak deposit	8 kilometers from Gaurdak	15,000
Do.		Khodzhaguymaskoye deposit	4 kilometers west of Gaurdak	NA
Do.		Kugitangskoye deposit	75 kilometers from Gaurdak	2,000
Do.		Uzun-Kudukskoye deposit	20 kilometers from Gaurdak	2,000
Salt		Kuulinskoye deposit	40 kilometers north of Turkmenbashi	650,000
Sand and gravel	cubic meters	Dushaksoye deposit		1,150,000 9/
Do.	do.	Kala-I-Morskoye deposit		925,000 9/
Do.	do.	Kernayskoye deposit		36,000 9/
Do.	do.	Kubatayskoye deposit		740,000 9/
Do.	cubic meters	Ufrinskoye deposit		900,000 9/
Sodium sulfate		Karabogazsulfate Association	Bekdash	400,000 9/
Strontium (celesite)		Arikskoye deposit (mining ceased 1992)	Near Gaurdak	NA
Do.		Shakhtaminskoye deposit	do.	NA
Sulfur		IA Turkmenmineral	Gora deposit	340,000 9/
Do.		Gaurdak plant	Gaurdak deposit (mining ceased 1997)	500,000
Do.		Darvaza, Segli-Kar, Kara-Kum sulfur plants	Kara-kum deposit (mining ceased 1962)	NA
Do.		Kugitangskoye deposit	75 kilometers from Gaurdak	NA
UKRAINE				
Alumina		Mykolayiv refinery	Mykolayivs'ka Oblast'	1,200,000
Do.		Zaporozh'ye (Dneprovsk) refinery	Zaporiz'ka Oblast'	245,000
Aluminum, primary		Zaporozh'ye (Dneprovsk) smelter	do.	120,000
Coal:				
Hard	thousand tons	Donets coal basin with about 225 mines produces more than 90% of Ukraine's coal	Dnipropetrovs'ka, Donets'ka, Luhans'ka Oblasts'	130,000 4/
Do.		Lviv-Volynskiy Basin produces remainder from 18 mines	Western Ukraine	6,000,000 4/
Brown		Dneprovskoye Basin	Central Ukraine	7,000,000
Ferroalloys:				
Ferrochrome		Zaporozh'ye plant	Zaporiz'ka Oblast'	NA
Ferromanganese (high and medium C)		do.	do.	NA
Do.		Nikopol' ferroalloys plant	Nikopol'	250,000
Ferromanganese, blast furnace		Konstantinovskiy metallurgical plant		NA
Do.		Kramatorskiy metallurgical plant (production ended in 1999)		NA
Manganese metal		Zaporozh'ye plant	Zaporiz'ka Oblast'	NA
Ferrosilicon		Nikopol' ferroalloys plant	Nikopol'	200,000
Do.		Stakhanov plant	Luhans'ka Oblast'	NA
Silicomanganese		Stakhanov plant	Luhans'ka Oblast'	1,200,000
Do.		Zaporozh'ye plant	Zaporiz'ka Oblast'	160,000
Do.		Nikopol' ferroalloys plant	Nikopol'	NA
Graphite		Zavalyevskiy graphite complex	Zavalyevskiy deposit	40,000
Iron ore:				
Underground mining		Krivbassruda production association with 16 mines	Kryvyy Rih Basin	15,000,000 4/
Do.		Eksplutatsionnaya Mine of the Zaporizhzhskiy iron ore complex	do.	3,500,000
Open pit mining		Inguletskiy, Kamysh-Burunskiy, Novokrivorozhski Poltaviskiy, Severnyy, Tsentralnyy, Yuzhniy mining and beneficiation complexes	Kryvyy Rih Basin	90,000,000 4/
Kaolin		Prosyanovskoye mining and beneficiation complex	Dnipropetrovs'ka Oblast'	NA

See footnotes at end of table.

TABLE 2--Continued

COMMONWEALTH OF INDEPENDENT STATES: STRUCTURE OF THE MINERAL INDUSTRIES IN 2001 1/ 2/ 3/

(Metric tons unless otherwise specified)

Country and commodity	Major operating companies or deposits	Location or deposit name	Annual capacity e/
UKRAINE--Continued			
Lead, secondary	Ukrtsink plant	Kostyantynivka	70,000
Magnesium	Zaporozh'ye plant	Zaporiz'ka Oblast'	10,000
Do.	Magnii concern	Kalush	18,000
Manganese:			
Ore, marketable			6,000,000 4/
	Marganets, Ordzhonikdze mining and beneficiatio complexes	Nikopol' basin	
	Tavricheskiy complex (under development)	Bol'shoy Tokmak basin	
Metal	Zaporozhye plant	Zaporiz'ka Oblast'	40,000
Sinter	Nikopol' ferroalloys plant	Nikopol	3,000,000
Mercury	Nikitovskiy mining and metallurgical complex	Donets'ka Oblast'	120
Nickel, Ni content in FeNi	Pobuzhhskiy mining and beneficiation complex, comprising three open pit mines and smelter	Pobugskoye Basin	7,000 4/
Potash, K_2O equivalent	Khlorvinil production association, Stebnik potash	Pricarpathian region	300,000
Steel, crude	Donets'k and Industrial Union of Donbas Alchevs' steel mill	Alchevs'k	4,500,000
Do.	Donets'k and Industrial Union of Donbas Azovstal' steel mill	Mariupol'	4,000,000
Do.	Donets'k and Industrial Union of Donbas Donets'k steel mill	Donets'ka Oblast'	1,300,000
Do.	Donets'k and Industrial Union of Donbas Dnepropetrovsk pipe plant		NA
Do.	Donets'k and Industrial Union of Donbas Khartsyzsk pipe plant		NA
Do.	Donets'k and Danko Yenakiyeveskiy steel mill		1,200,000
Do.	Donets'k and Privat Bank Dnepropetrovsk pipe plant		1,230,000
Do.	Donets'k and Privat Bank Zaporozh'ye rolling mill	Zaporiz'ka Oblast'	2,300,000
Do.	Donets'k and Privat Bank Dneprovskiy steel mill	Dniprodzerzhyns'k	3,850,000
Do.	do.	Dnipropetrovs'ka Oblast'	1,900,000
Do.	Donets'k and Privat Bank Konstantnovskiy steel mill		NA
Do.	Donets'k and Privat Bank Dneprospetssstal	Zaporiz'ka Oblast'	1,400,000
Do.	Il'yich plant	Mariupol'	7,300,000
Do.	Kirov plant	Makeyevka	4,000,000
Do.	Kryvy Rih plant	Kryvyy Rih	10,650,000
Do.	Interpipe group Nizhnedneprovskiy pipe plant		NA
Do.	Interpipe group Nikopol' pipe plant		NA
Sulfur	Sera production association	Rozdol mining complex mines (Rozdol, Soroks, Zdhidalchev deposits); Yarvorov complex mines (Nemirov-Yazov deposits in Livivs'ka and Kyyivs'ka Oblasts')	1,500,000 4/
Titanium:			
Ilemenite, concentrate			600,000 4/
	Irshanskiy mining and beneficiation complex	Irsha Valley	
	Vol'nogorsk state mining/metallurgical complex	Dnipropetrovs'k region	
	Verkhnedneprovskiy mining/metallurgical complex	Verkhnedneprovsk region	
Rutile	do.	do.	60,000
Do.	Vol'nogorsk state mining/metallurgical complex	Dnipropetrovs'k region	NA
Sponge	Zaporozh'ye titanium-magnesium plant	Zaporiz'ka Oblast'	20,000
Uranium	Zheltye Vody complex	Northern part of Kryvyy Rih Basin	NA
Zinc, secondary	Ukrtsink plant	Kostyantynivka	25,000
Zirconium:			
Ore, zircon	Verkhnedneprovskiy mining/metallurgical	Verkhnedneprovsk region	100,000
Do.	Vol'nogorsk state mining and metallurgical comple	Dnipropetrovs'k region	NA
Metal and compounds	Pridneprovskiy chemical plant	Dnipropetrovs'ka Oblast'	NA
Do.	Kharkiv physical-technical institute	Kharkivs'ka Oblast'	NA
UZBEKISTAN			
Bismuth	Ustarassay deposit (depleted)	Chotqol and Kuraminskiy Khrebet regions	NA
Cesium, lithium, rubidium	Shava-Say deposit		NA
See footnotes at end of table.			

TABLE 2--Continued
COMMONWEALTH OF INDEPENDENT STATES: STRUCTURE OF THE MINERAL INDUSTRIES IN 2001 1/ 2/ 3/

(Metric tons unless otherwise specified)

Country and commodity	Major operating companies or deposits	Location or deposit name	Annual capacity e/
UZBEKISTAN--Continued			
Clays:			
Bentonite	Arab-Dasht and Khaudag deposits		NA
Kaolin	Angren deposit	Angren region	8,000,000
Coal	Central Asian Coal Association (mining):		
	Angren brown coal deposit	do.	6,000,000
Do.	Baysunskoye and Shargunskoye deposits	Surkhandarya region	1,000,000 4/
Copper:			
Mine output, Cu content	Almalyk mining and metallurgical complex	Dalneye, Kalmakkyrgan, Sary-Cheku deposits	100,000 4/
Metal	Almalyk refinery	Olmaliq	130,000
Diamond	Karashok and Kok-Say deposits	Nawoiy District	NA
Feldspar	Karichasayskoye and other deposits	Deposits in Samarqand and Toshkent Wiloyati region Karakalpakstan (Kara-Kalpakskaya ASSR)	120,000 4/
Fertilizers	Ammophos production association	Olmaliq	NA
Do.	Azot production association	Farghona	NA
Do.	Elektrokhimprom production association	Chirchiq	NA
Do.	Kokand superphosphate plant	Qo'qon	NA
Do.	Naviazot production association	Nawoiy Wiloyati	NA
Do.	Samarkand chemicals plant	Samarqand	NA
Fluorspar	Agata-Chibargata, Aurakhmat, Kengutan, Kyzylbaur, Naugarzan, Nugisken deposits	East of Toshkent Wiloyati	150,000
Do.	Syrpatash deposit	Namanganskaya Oblast'	NA
Gold kilograms	Adzhi-Bugutty, Balpantau, Bulutkan, Donguz-Tau, Muruntau, Taurbay deposits	Kyzylkum region	85,000 4/
Do.	Nawoiy Integrated Mining and Metals complex	Muruntau deposit	50
Do.	Kochbulak and Kyzyl-Al'ma-Say deposits	Tashkentskaya Oblast'	NA
Do.	Almalyk mining and metallurgical complex	Dalneye, Kalmakkyrgan, Sary-Cheku deposits	NA
Graphite	Tadzhi-Kazgan deposit	Navoiyskaya Oblast'	NA
Iron ore	Syurenata deposit	Tashkentskaya Oblast'	NA
Lead, mine output, Pb content	Almalyk mining and metallurgical complex; Altyn-Topkan and Uchkulach deposits	Uchkulach deposit in Toshkent Wiloyati; Altyn-Topk deposit in Kurama mountain range in Tajikistan (in March 1999, Altyn-Topkan transferred to control of Tajikistan)	40,000 4/
Manganese	Dautashskoye deposit	Kashkadar'inskaya Oblast'	40,000
Molybdenum:			
Mine output, Mo content	Almalyk mining and metallurgical complex; Kalmakyr, Sarycheku deposits	Toshkent Wiloyati	900 4/
Metal	Uzbek refinery and hard metals plant	Chirchiq	NA
Natural gas liquids million cubic meters	Mubarek gas processing plant	Muborak	28,000
Do.	Shurtan gas-chemical complex	Shurtan-Say deposit, Kashkad'ya region	137,000
Petroleum and natural gas:	More than 160 oil and gas deposits; 92 deposits under exploration:	Bukhoro-Khiwa, Sukhandarya Oblast, southwest of Gissarak, and Ustyurtskiy regions and Farghona Valley	
Natural gas million cubic meters	Gazli, Kandym, Khauzak, Kokdumalak, Pamuk, Shurtan-Say deposits (major)	Amu-Dar'ya Basin; Mubarek area	70,000 4/
Do.	Itera/Lukoil (Russia), Uzbekneftegaz JSC	Kan-Dam field	NA
Natural gas condensate	Trinity Energy (United Kingdom)	Ustyurt Plato region	NA
Petroleum:			
Crude	Kokdumalak and Mingbulak deposits (major)		9,000,000 4/
Refinery products	Fergana oil refinery	Farghona region	8,800,000
Do.	Bukhara oil refinery	Bukhoro	2,500,000
Phosphate	Kyzyl Kum complex	Dzheroy-Sardarin Moroccan type, Karaktay, and Severnyy Dzhetymtau deposits	NA
Polyethylene	Shurtan gas-chemical complex	Shurtan-Say deposit, Kashkad'ya region	125,000
Potash	Tyubegatan deposit	Southern Uzbekistan	NA
Silver	Kosmanachi, Okzhetpes, Vysokovoltnoye deposits	Namanganskaya Oblast'	NA
Steel, crude	Bekabad steel mill	Bekabad	1,100,000
Sulfur	Mubarek gas processing plant complex	Muborak	2,000,000

See footnotes at end of table.

TABLE 2--Continued
COMMONWEALTH OF INDEPENDENT STATES: STRUCTURE OF THE MINERAL INDUSTRIES IN 2001 1/ 2/ 3/

(Metric tons unless otherwise specified)

Country and commodity	Major operating companies or deposits	Location or deposit name	Annual capacity e/
UZBEKISTAN--Continued			
Tungsten:			
Mine output, W content			1,200 4/
	Koytash deposit	Northeastern Uzbekistan	
	Ingichka, Lyangar deposits	Zirabulak Mountains	
	Ugat deposit	Northern Uzbekistan	
Mine output, WO_3 content (0.49%)	Sautbay wolframite deposit	Kyzylkum region	NA
Metal	Uzbek refractory and hard metals plant	Chirchiq	NA
Uranium, U content	Naviazot mining and metallurgical complex	Navoiy region	3,000
Vermiculite square meters	Tebin-Bulak deposit		25,000

e/ Estimated. NA Not available.

1/ Table includes data and information available through April 2003.

2/ Estimated data are rounded to no more than three significant digits.

3/ Many location names have changed since the breakup of the Soviet Union. Many enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepencies in the names of enterprises their locations.

4/ Capacity estimates are totals for all enterprises that produce that commodity.

5/ For a listing of production-sharing agreements for oil and gas development, refer to the USACC Investment Guide to Azerbaijan 2001, United States-Azerbaijan Chamber of Commerce, Washington, DC.

6/ Capacity for crude petroleum distillation.

7/ Total peat for fuel use production.

8/ Crude throughput.

9/ Reported figure.

10/ Coproduct and byproduct of gold and nonferrous metals mining.

TABLE 3
COMMONWEALTH OF INDEPENDENT STATES: GROSS DOMESTIC PRODUCT AND INDUSTRIAL OUTPUT IN 2001

(Output as a precentage of those in 2000 in constant prices)

Country	Gross domestic product	Industrial output
Armenia	109.6	103.8
Azerbaijan	109.9	105.1
Belarus	104.1	105.4
Georgia	104.5	98.9
Kazakhstan	113.2	113.5
Kyrgyzstan	105.3	105.4
Moldova	106.1	114.2
Russia	105.0	104.9
Tajikistan	110.2	114.8
Turkmenistan	NA	NA
Ukraine	104.5	114.2
Uzbekistan	109.0	NA

NA Not available.

Source: Interfax Information Services B.V. Statistical Report, 2002, Key Socioeconomic Indicators for Individual CIS Nations in 2001, Key Results Indicators by Economic Sector in CIS Nations, March 15-22, v. 11, issue 12, p. 3, 7-8.

THE MINERAL INDUSTRIES OF

THE CZECH REPUBLIC, HUNGARY, POLAND, AND SLOVAKIA

By Walter G. Steblez

The Central European transitional economy countries of the Czech Republic, Hungary, Poland, and Slovakia represent one of the more economically dynamic regions of the former centrally planned economy countries of Europe and Central Eurasia. As founding members of the Central European Free Trade Agreement (Bulgaria, Romania, and Slovenia joined in 1999), these countries have continued to implement policies designed to harmonize standards and trade with a view to integrate themselves fully into the European Union (EU), as they had done already in the European security sphere through membership in the North Atlantic Treaty Organization. To accommodate new standards, the development of new commercial infrastructure in the region has warranted continued focus on the region's cement, industrial minerals, and steel industries. The trend of large-scale foreign investment in the cement and associated quarrying industries in the Central European region, which emerged during the 1990s, also became more clearly discernible in the region's iron and steel sectors during 2001.

CZECH REPUBLIC

The Czech Republic was an important Central European producer of heavy industrial goods manufactured by the country's toolmaking, machine building, and chemical industries. Steelmaking, the mining and processing of industrial minerals, and the production of construction materials continued to be of domestic and regional importance.

In 2001, the country's economy continued to improve. The gross domestic product (GDP) increased by 3.3% compared with that of 2000 (Emerging Europe Monitor, 2002a). Industrial production increased by 6.8%. According to data provided by GEOFOND, which was the country's leading mineral information agency, the mining and processing sector's share of the GDP declined to 1.5% in 2000 from 3.7% in 1993 (GEOFOND, 2001, p. 171). In 2001, the privatization of the iron and steel sector continued dominate events in the country's minerals industry.

Government Policies and Programs

The Government continued policies of economic development the aim of which has been to integrate the country into the EU. The country's membership in the International Monetary Fund, the Organization for Economic Cooperation and Development (OECD), the World Bank for Reconstruction and Development, and the World Trade Organization (WTO) and participation in the General Agreement on Tariffs and Trade was largely an outcome of the Czech Republic's full orientation to a Western European political system and market economy.

Three constituent acts compose the country's mining law, which forms the foundation of the Government's mining and other mineral-related policies. Act No. 44/1988 Coll. on protection and use of mineral resources (the Mining Act), as amended; the Czech National Council Act No. 61/1988 Coll. on mining activity, explosives, and state mining administration (Authority/Sedenka), as amended; and the Czech National Council Act No. 62/1988 Coll. on geological works, as amended. The Mining Act classifies minerals into either "reserved" and "unreserved" categories. The reserved category refers to mineral deposits that, apart from market considerations, were determined to be necessary for the development of the national economy (Luks, 1997; GEOFOND, 2001, p. 17). Other provisions in the mining law address issues of licensing and Federal and regional compliance with environmental regulations during the exploration and exploitation of a mineral deposit and the reclamation of mined-out areas.

To meet the needs of a developing market economy, major changes in the Czech Republic's environmental policies were enacted in 1997. On the basis of environmental principles that were approved by the Government in 1995, the new policy was officially formulated in the environmental law of 1997, Act No. 125 1997. Also, four of the six enabling provisions of the new law were formally adopted at the same time as the new law on January 1, 1998. The environmental law focused on reducing the volume of waste, discreet collection of waste by category, and recycling. The law adopted the main provision in EU and OECD regulations as well as those of the Basle Convention. The new catalogue of wastes is compatible with the European Catalogue of Wastes of the EU.

Production and Trade

In 2001, the iron and steel industry, which constituted the major part of the country's metallurgical sector, showed production increases in pig iron (1.2%), crude steel (1.6%), and steel semimanufactures (8.7%). With respect to the raw materials inputs to the iron and steel industry, the Czech Republic largely remained dependent on imports. The country no longer mined iron ore and, according to 2000 trade data, depended mostly on Ukraine (80%) and Russia (19%) for imports of iron ore and concentrate. In 2000, total imports of iron ore were more than 6.9 million metric tons (Mt), which was an increase of about 29% compared with that of 1999

(GEOFOND, 2001, p. 22). Net imports of pig iron amounted to about 33,000 metric tons (t). The Czech Republic, however, was a significant net exporter of iron and steel scrap, which amounted to about 804,000 t, or an increase of about 12% compared with that of 1999.

Although the output of the mineral fuels sector remained at about the same levels of production as in 2000, the output of industrial mineral registered mixed results. Major production shortfalls were reported by the cement-producing (13%) and dimension-stone-quarrying (12%) branches that were key to the country's construction sector. Such other industrial minerals as feldspar (22%) and undifferentiated clays (21%) reported better production results for the year (table 1).

Commodity Review

Metals

The Czech Republic's metals sector produced a broad range of base metals and semimanufactures from imported primary raw materials (ores and concentrates) and secondary materials (scrap). The metals sector generally has represented approximately 10% of the value of the country's industrial production during the later part of the 1990s. The iron and steel branch alone has generated between 8% and 9% of the industrial output. Employment in the metals sector accounted for about 10% of the Czech Republic's industrial workforce; the iron and steel sector accounted for about 8%. In recent years, the iron and steel industry's material costs have constituted about 60% of total production costs of the metals sector, and labor costs have amounted to about 12% (Ambroz, 1997).

The iron and steel branch also has accounted for more than 75% of the sales of the country's metals sector that comprised 12 enterprises. They produced pig iron, crude steel, rolled materials, and steel and cast iron pipes, which included closed welded pipe steel and various welded semimanufactures. The nonferrous metals branch, which comprised nine major enterprises, produced finished and semifinished commodities of nonalloyed and alloyed aluminum, copper, and lead. The nonferrous metals branch has relied entirely on domestic and imported scrap and on imports of ore and concentrate and semimanufactured products as its raw materials base. In recent years, scrap, as a component in all new metals production, has ranged between 40% and 50% (Urban, 1998).

Although gold mining in some parts of the Czech Republic remained prospective, economic resources of most metals have been depleted. According to GEOFOND (2001, p. 19), most of the country's metallic mineral deposits as of December 31, 2000, were not economic. Gold-bearing and tin-tungsten ores were among the exceptions.

Copper.—The Czech Republic imported copper to meet all its industrial needs. From 1998 to 2000, copper imports remained steady and averaged more than 14,300 t. In 2000, imports of refined copper and copper alloys amounted to 14,223 t; Poland, Austria, and Germany supplied 43%, 29.8%, and 24.9%, respectively, of total imports. From 1996 to 2000, the country apparently was a net exporter of copper scrap; exports ranged from about 24,600 to 34,000 t (GEOFOND, 2001, p. 30-31).

In 2001, significant events in the Czech Republic's copper industry included plans to shift the orientation of production at Kovohuti Rokycani AS away from copper and copper alloy foundry products to the output of finished materials. Kovohuti Rokycani, which was a leading Czech manufacturer of semimanufactured and wrought commodities of bronze, copper, and nickel, indicated that the transition was to be implemented gradually during several subsequent years (Metal Bulletin, 2001b). Additionally, Kovohute Calakovice AS, which was the country's major processor of copper scrap, implemented investment plans that included the addition of two new furnaces and the modernization of the plant's three presses. The company's management expected the investment program to raise efficiency that would not only increase profits, but also raise domestic market share to 80% from 75%. The company has produced more than 12,200 t/yr of copper rod, pipe, and wire (Metal Bulletin, 2001s).

Iron and Steel.—The Czech Republic had eight deposits of iron ore that were determined to be uneconomic and no longer were worked. All the raw materials consumed by the country's steel industry—iron ore and concentrate and pellets and agglomerate—were imported. In 2000, about 7 Mt of iron ore and concentrate was imported, mainly from Ukraine and Russia, which accounted for about 80% and 19%, respectively, of total imports. Net imports of pig iron amounted to 33,000 t, and net exports of iron and steel scrap amounted to more than 800,000 t (GEOFOND, 2001, p. 22). Manganese, which is of prime importance to the steel industry, was obtained entirely from imports of ores and concentrates (10,436 t; Ukraine, 63%), ferromanganese (17,569 t; Slovakia, 50%), and ferrosilicomanganese (22,300 t; Slovakia, 53%) (GEOFOND, 2001, p. 26). The steel industry operated eight steel plants with a collective capacity to produce almost 11 million metric tons per year (Mt/yr) of steel. The main steel producers were Nova Hut s.p. Ostrava (NH), Zelezarne Vitcovice a.s., Trinecke Zelezarny (TZ), and Poldi United Steel Works and accounted for more than 95% of total crude steel production capacity.

The restructuring and privatization of the Czech Republic's entire iron and steel sector were among the major issues during 2001. The reorganization of the steel industry was based on a study commissioned by the Government, which was completed by a group headed by the Czech and Slovak Steel Federation in October 1999. The Government's plan to implement the first phase of the restructuring program included a 20% reduction of steel production capacity that was to result in the closure of 17 furnaces, 10 of which were electric arc furnaces, and 17 rolling mills. The closure cost was estimated to be about $96.7 million, and the total cost of the restructuring plan would cost about $2 billion. NH, TZ, and Vitcovice were also the country's integrated producers of steel that accounted for more than 90% of total steel output; these large enterprises also pursued individual development plans to be able to compete in the EU market (Walawalker, 2000).

The rationalization of the iron and steel industry and the increasing foreign investor interest Czech ferrous metallurgy were among the salient issues of 2001. One of the rationalization schemes of the Government for the steel industry involved the amalgamation of NH, TZ, and Vitcovice into one national iron and steel corporation that would have a production capacity of about 6.45 Mt/yr and would be privatized as a single unit. The plan envisaged the acquisition of NH and Vitcovice by TZ, which was privately owned. Previous suggestions to consolidate the industry were rejected outright owing to concerns of creditors that such restructuring could jeopardize outstanding loan repayments (Lansdowne, 2001a; Metal Bulletin, 2000). The facility closure component of their plan was to include the medium section mill at TZ, a heavy section mill at NH, and a plate mill at Vitcovice.

By yearend, the plan had come under increasing scrutiny from the EU's European Commission, which raised questions about the viability of the plan in view of EU regulations that concern Government involvement and subsidy issues and the lack of an in-depth long-term economic analysis of the industry. The issue of privatization of the steel sector was not fully resolved by the end of 2001 (Metal Bulletin, 2001m, s).

Acquisition and merger activities during the year that involved TZ included a 10-year lease agreement with Zelezarny Veseli, that will allow TZ to operate Veseli's drawn steel rod mill. Feedstock, which ranged between 80,000 and 100,000 t/yr of steel, would be delivered from the main TZ steelmaking facilities (Metal Bulletin, 2001aj). Also, in midyear, in anticipation of the proposed integration of the country's steel industry, TZ acquired an 11.5% share of stock in NH; this acquisition was supported by Commercial Metals International of the United States, which was one of TZ's shareholders (11% of shares) (Metal Bulletin, 2001ai). Earlier in the year, TZ also considered acquiring the Poldi-Drin steelworks in Kladno whose rolling mill TZ leased and operated during the previous 3 years; the final outcome of its bid, however, was not known by yearend (Metal Bulletin, 2001ah). Additionally, TZ and its majority stockholder, Moravia Steel a.s. (65%), merged into one operation as a further step in the restructuring process (Metal Bulletin, 2001ak).

Vitcovice continued to implement a program of rationalization, which began in 2000. The plan included the divestiture of such noncore business-related operations as cafeterias, hotels, and stadiums. Following a change in management in July, the company's steel division was transformed into a separate corporate subsidiary (Vitcovice Steel) in anticipation of the steel industry's full reorganization (Bennett, 2001; Metal Bulletin, 2001u, am). In late 2001, there was investor interest from steelmaking concerns in the EU and the United States, although no firm offers were made (Metal Bulletin, 2001an).

At the start of the year, the privatization of NH, which would involve the sale of 67% of the company's shares (49% state and 18.25% Credit Suisse owned) was one of the major plans that were developed. Despite a renewal of interest by several European investors, which included that of Switzerland-based Duferco International Investment Holding Ltd., whose negotiations with the Czech Government in 2000 to acquire NH ended unsuccessfully, the Government put its plans to privatize NH into abeyance pending a resolution of the issue of total steel industry reorganization (Metal Bulletin, 2001c, d, g).

Disputes with unions about wage rates and with suppliers over equipment quality were among other issues that affected NH during the year. The labor issue appeared to have been resolved in April (Metal Bulletin, 2001x, y). The dispute concerned equipment quality and involved NH's Steckel strip mill where it was alleged that the mill's equipment, which was delivered by Kaiser BV, was not in accord with specifications. The Steckel mill, which was operating at about 70% of capacity towards the end of the year, was losing money (Metal Bulletin, 2001w, ae).

NH's investment activities in 2001 included the takeover of Valcovny Plechu a.s., which produced alloy, carbon, and stainless steel cold-rolled sheet. The takeover gave NH a 55.6% share of Plechu's stock (Metal Bulletin, 2001z).

Lead and Zinc.—Lead and zinc have not been mined in the Czech Republic for at least 6 years. The number of registered deposits declined to 11 in 2000 from 27 in 1995; none, however, were under exploitation during this period (GEOFOND, 2001, p. 35, 39). The primary source of domestic lead was recycled batteries collected and processed by the Czech Republic's sole recycler of secondary lead, Kovohute Pribram. In addition to secondary lead processing, Pribram indicated that the purchase of scrap that contained precious metals will increase and that their recycling (gold, palladium, platinum, and silver) would raise company profits (Metal Bulletin, 2001e).

The latest available trade returns showed that Germany supplied about 72% of the 53,000 t of unwrought lead that was imported by the Czech Republic in 2000. Net imports of lead for consumption amounted to about 40,200 t. Similarly, imports of unwrought zinc in 2000 exceeded 27,700 t; this was an increase of about 30% compared with those of 1999. Poland and Germany, which were the major zinc exporters to the Czech Republic, accounted for about 58% and 12%, respectively, of the total zinc imports (GEOFOND, 2001, p. 35, 39).

Magnesium.—Magnesium Elektron (a subsidiary of Luxfer Group of the United Kingdom) began operations at its new secondary magnesium processing plant in northwestern Prague in late October. The initial capacity was about 7,000 t/yr of magnesium. A second commissioning phase, however, was scheduled for 2002 and would raise the plant's capacity to 10,000 t/yr of secondary metal (Flux Magnesium Recycling Brief, 2002; Metal Bulletin, 2001t).

Industrial Minerals

The Czech Republic was well endowed with and produced a broad range of industrial minerals that met most of domestic construction and chemical industries's requirements, as well as those for export. The availability of these minerals at the recent average rate of mining ranged from about 37 years for gem-grade pyrope ore to more than 700 years for silica raw materials. Such corrective additives as clays, loams, loess, shales, and sands needed by the country's cement industry to regulate the content aluminum oxide (Al_2O_3), iron oxide (Fe_2O_3), and silicon oxide (SiO_2) during clinker production, in aggregate, were reported to have a mining life of about 830 years (GEOFOND, 2001, p. 83).

During the late 1990s, foreign investment in the Czech Republic's minerals industry focused primarily on the acquisition of cement plants and their associated raw materials quarries. Investment in Czech industrial minerals enterprises continued in 2001 with the acquisition of the Czech Republic's white-fused alumina producer Chemicke Zavody Sokolov a.s.

(CHZS) by Treibacher Schliefmittel AG (Treibacher) of Austria. Treibacher, which was one of the world's major producers of fused alumina, planned to incorporate CHZS as Treibacher Schliefmittel sro. Treibacher also planned to modernize the plant's production process. CHZS had been producing about 10,000 t/yr of fused while alumina, which is used in the manufacture of abrasives and refractory materials (Industrial Minerals, 2001).

Mineral Fuels

The energy policy of the Czech Republic has promoted the following aims: the decontrol of prices for energy; the denationalization, rationalization, and restructuring of the energy industry sector; an increase in the level of conservation, health and safety, and pollution control in the energy sector; the diversification of electricity, natural gas, and petroleum supply; and the raising of the efficiency of domestic production of fossil fuels. To help make its governmental and economic structures more compatible with those of the EU, the Government will proceed with harmonizing the country's energy sector's standards with those of the EU.

Coal.—Bituminous, or hard coal, occurs mainly in the Upper Silesian basin. Of the resources in this region, only about 15% is in the Czech Republic; the balance of the resources is in Poland. Bituminous coal (phytokaustobiolite, as it is described in the Czech Republic's annual Mineral Commodity Summaries of the Czech Republic) has a higher degree of coalification than lower rank coals. Some of the characteristics of Czech bituminous coal include a carbon content of more than 73.4%, volatile matter of less than 50%, and a dry (ash-free) calorific value that exceeds 24 megajoules per kilogram (MJ/kg). As of December 31, 2000, the Czech Republic reported that the total resource of bituminous amounted to about 16.354 billion metric tons (Gt). Coal output in 2000 remained steady at just more than 17 Mt. Imports of 1.095 Mt were derived almost exclusively from Poland. About 6 Mt of bituminous coal was exported, mainly to Austria, Germany, and Slovakia (GEOFOND, 2001, p. 62, 63).

In addition to bituminous coal, the Czech Republic distinguishes two types of lower rank coal—brown coal and lignite. Brown coal has a lower level of coalification; that is, with a fixed level of carbon of less than 73.5%, volatiles of more than 50%, and a dry (ash-free) calorific value of less than 24 MJ/kg. The vitrinite reflective boundary between bituminous coal and brown coal is lower than 0.5% for brown coal. The boundary between brown coal and lignite, however, is not recognized owing to the inclusion of high volatile lignite in the brown coal category (GEOFOND, 2001, p. 67). The Czech Republic's brown coal deposits are worked in the northwestern part of the country in the Bohemian brown coal basins. The major brown coal basins are found in Krusnehory Mountains region and cover an area of 1,900 square kilometers (km^2). Coal also is mined in the Cheb, Sokolov, and Zitava basins. As of December 31, 2000, total resources of brown coal amounted to more than 9.652 Gt. Brown coal was used primarily as a fuel in the country's electric power industry; a minor proportion was consumed by the chemicals sector. In 2000, major foreign commerce in brown coal centered on exports of about 3 Mt; Germany (67%) and Slovakia (26%) were the major recipients (GEOFOND, 2001, p. 67, 69). According to GEOFOND (2001, p. 71), Czech standards for coal describe high-volatile lignite as a variety of brown coal that has undergone the least amount of coalification and still has xylitic characteristics (fragments of wood, preserved tree trunks, etc.). Its dry calorific value is less than 17 MJ/kg. The boundary between brown coal and high-volatile lignite is not distinct. Lignite is consumed mainly by the electric-power-generating sector; it also is used for heating. The chief deposits occur in the Vienna basin, which extends from Austria to Moravia. Total resources of lignite in the Czech Republic at the end of 2000 amounted to more than 1.029 Gt (GEOFOND, 2001, p. 71).

Natural Gas and Petroleum.—According to GEOFOND (2001, p. 75), the Czech Republic's oil-and-gas-bearing/ producing area is in the so-called Vienna-Moravia oil-bearing province. The deposits in this area are hosted in a large number of "individual oil-bearing structures and producing horizons ..." to a depth of 2,800 meters (m). Sandstones of Middle and Upper Badenian age are described as hosting the most productive oil deposits. Hrusky was the largest deposit, but most of the oil had been extracted, and the structure serves mainly as an underground gas storage facility. Another oil-bearing area is in the Moravian region of the Carpathian foredeep where exploration was being conducted. Petroleum in this region occurs in weathered crystalline Paleozoic rocks. The prevailing type of petroleum is a light, sulfur-free paraffin to paraffin-napthene oil. As of December 31, 2000, the Czech Republic's petroleum resources amounted to about 37.5 Mt, of which about11.1 Mt was categorized as economic proven; 13.5 Mt as economic probable; and about 12.9 Mt as subeconomic.

In 2000, the Czech Republic imported about 5.8 Mt of petroleum, of which about 4.8 Mt was imported from Russia, and about 500,000 t came from Kazakhstan. Total imports of petroleum from the Commonwealth of Independent States (CIS) accounted for more than 90% of the country's import needs. Exports during the same period were about 111,000 t (GEOFOND, 2001, p. 76). Natural gas production declined by about 17% from 143 million cubic meters produced in 1999. In 2000, Russia supplied the Czech Republic with about 78% of more than 9.5 billion cubic meters of natural gas imports; about 21% was obtained from Norway (GEOFOND, 2001, p. 80).

HUNGARY

Bauxite was the only major nonfuel mineral produced in Hungary that was significant in terms of European mineral production. In 2001, Hungary maintained production of modest amounts of fossil fuels, industrial minerals, and metals. Despite substantial production of bauxite and alumina, Hungary's production of primary aluminum remained modest owing to limited domestic sources of energy. The production of coal, natural gas, and petroleum was sufficient to satisfy only about one-half of the country's annual energy needs.

In 2001, Hungary's GDP increased by 3.7% compared with that of 2000. The gross output (value) of industry rose by about 5.0%, and that of mining and quarrying, by about 6%. The volume of output by the mining and quarrying sector increased by about 16.3% compared with that of 2000. Total investment in the mining and quarrying sector, however, declined by about 42% compared with the level of investments in 2000 (Hungarian Central Statistical Office, 2002, p. 282, 300, 396).

Government Policies and Programs

The Government based its regulatory policies for mining and geologic survey work on provisions in the Mining Law of 1993 (Act XLVIII). Section 50 of the Mining Law was the basis for Governmental Decree No. 132/1993, which constitutes the legislative basis for the Hungarian Geological Survey. The Mining Law and related decrees and codes established the legislative bases for estimating reserves, determining environmental risks associated with mining, and providing the geological and technical information needed to outline tender conditions.

Government agencies that were responsible for enforcing existing environmental protection laws and regulations included the Ministry of the Environment and Regional Planning (KTM) and the Hungarian Mining Office (MBH). The KTM was authorized to help only in the enforcement of existing environmental legislation prescribed by other ministries of the Government. With respect to mining and minerals, Hungary's Ministry of Industry and Commerce had the primary responsibility for establishing environmental regulatory standards. The chief responsibility of the MBH was that of a certifying agency, which could review only technical developmental and operational plans. These plans were required to include provisions that pertain to environmental protection and land restoration by responsible entities.

Production and Trade

The output of bauxite declined by about 4% compared with that of 2000. The production of crude steel increased by 4%. Among industrial minerals, the production of cement also showed gains of more than 4%. Although total coal output fell by about 2%, a much sharper reduction of bituminous coal production (about 23%) was reported. Brown coal production also fell during this period by about 10% (table 3).

Hungary's output fossil fuels and industrial minerals was modest. To meet the needs of its economy, the country relied heavily on imported mineral raw materials. In 2001, the imports of crude raw materials, by volume, which included minerals, declined by about 1% compared with those of 2000; those of mineral fuels and electric power also reported slight declines. Crude raw material exports fell by about 13%; exports of mineral fuels and electric power rose by about 18% compared with those of 2000. The value of imports of metal ore and scrap fell short of the 2000 import level by about 9%; exports of ore and scrap also declined by only about 1.5%. Imports and exports of iron and steel showed increases of about 4% and 1%, respectively. Only slight increases, however, were reported for imports and exports of nonferrous metals (Hungarian Central Statistical Office, 2002, p. 316).

Imports and exports of industrial mineral products rose by about 9.4% and 3.5%, respectively. For mineral fuels, the value of imports was about 4.7 times greater than that of exports; imports of natural and manufactured gas and coal and coal products and rose by 24.4% and 2%, respectively, while their exports fell by about 42% and 33%, respectively (Hungarian Central Statistical Office, 2002, p. 310-311, 316-317).

Commodity Review

Metals

Bauxite mining and refining to alumina and manganese mining remained the only metal mining and processing operations in Hungary. Bakonyi Bauxitbanya Kft. mined the bauxite in the Bakonyi District; Hungary's total resources of bauxite were estimated to be about 26 Mt, of which commercial reserves amounted to 16 Mt, at an average grade of 50.4% Al_2O_3 and 7% SiO_2. National Ore and Mineral Mines Ltd. continued to mine both manganese carbonate and oxide ores at Urkut.

Although Hungary no longer mined copper, past surveys of the deep-lying (900-1,100 m) Recsk copper ore body in the Matra Mountains discovered between 172 and 175 Mt of copper ore at a grade of 1.12% copper and about 20 Mt of polymetallic ore at a grade of 4.22% lead and 0.92% zinc, as well as smaller quantities of gold, molybdenum, and silver. Geologic investigations conducted by the Government determined the area of mineralization to be about 10 km^2. After years of failed efforts to attract foreign investment, the exploration shaft and adit at the Recsk copper deposit, which was under care and maintenance, finally was closed, the equipment removed, and the facilities flooded in 1999 (Molnar, 2001). Gold exploration, however, was conducted in recent years in this region. In 2001, European Minerals Corporation (formerly Kazakhstan Minerals Corp.) explored for epithermal deposits of gold and silver (European Minerals Corporation, 2001).

Iron and Steel.—Given that the growth of the gross domestic product in 2002 and 2003 was anticipated to be only slightly less than that achieved in 2001, according to the Hungarian Steel Industry Association, the country's consumption of steel was expected to range between 2.5 and 2.7 Mt/yr (Lansdowne, 2001b). In 2001, the output of crude steel in Hungary grew by 4.4% compared with that of 2000. As in the other Central European countries, acquisitions and mergers in the steel sector were increasing, which reflected the Government's program to accommodate EU standards and practices in preparation for Hungary's entry into the EU. All concentrates and ores needed for the country's three steel producers were imported.

In mid-2001, Italy's Cogne Acciai Speciali Srl, which was a producer of alloy, stainless, and tool steels, acquired Dam-Diósgyör Acélmûvek Rt (DAM), which produced alloy, bearing, carbon, free-cutting, stainless, and tool steels. The new owners purchased DAM, which had been in receivership for more than a year, for about $14.7 million and renamed it Dam Steel Speciális Acélgyártó Rt. Management plans included bringing DAM's product mix closer to that of its parent company and increasing foreign foreign sales (Metal Bulletin, 2001n).

Chief issues of concern for OAM-Ozdi Acelmuvek Kft, which was a major Hungarian producer of carbon steel, rebar, and welded wire mesh (owned by Max Aicher GmbH of Germany), involved increasing imports of rebar from Poland and other Central European countries at a time when domestic demand showed marked growth. This concern prompted the Government to levy a 4.5% duty for about a 12-month period.

Hungary's imports of rebar throught the end of August amounted to about 47,000 t, or about one-half of Ozd's sales. The country's construction sector showed rapid expansion during the year, which formed a large part of the increase in steel demand (Metal Bulletin, 2001o).

Although plans were developed to privatize Dunaferr Dunai Vasmû Részvéntársaság (Dunaferr), which was Hungary's largest integrated steel producer, few parties were interested owing to the company's low profitability and a capital requirement that amounted to about $750 million (Metal Bulletin, 2001v). Operating losses through the third quarter of 2001 were reported to have totaled to about $9.5 million (Metal Bulletin, 2001j).

In 2001, capital improvement at Dunaferr showed mixed results. A program to modernize a 480,000-t/yr cold-rolling mill was scheduled to begin in December at DVVA Dunaferr-Voest-Alpine Hideghengermû Kft (DVVA), which was a joint venture created by Dunaferr (60%) and Voest-Alpine Stahl AG of Austria (40%). The modernization program (about $7 million), which will take about 2 years to complete, will focus on upgrading its skin pass mill to raise the quality of the cold-rolled strip (Metal Bulletin, 2001ap). Dunaferr's request for funds to rebuild its coke ovens, however, was not approved by the state privatization organization and Dunaferr's managing agency APV Rt, which restricted outlays for capital investments to capital generated from profits (Metal Bulletin, 2001i).

Industrial Minerals

Hungary produced a broad range of industrial minerals that included aggregates, bentonite, kaolin, and perlite. Such industrial minerals as construction aggregates and cement continued to play an important role in Hungary's economy, especially in view of their role in the modernization process necessary for the country's infrastructure. Highway construction planned through 2008 would continue to be an important element.

Mineral Fuels

Domestically produced coal, natural gas, and petroleum have accounted for 40% of Hungary's energy needs. Hungary produced more than 1 Mt/yr of crude petroleum from reserves that amounted to about 22 Mt; most petroleum (9 Mt), however, was imported from Russia via the Friendship Pipeline. Similarly, a substantial and increasing amount of natural gas was being imported from Russia through Russia's gas-main network (Molnar, 2002).

Hungary classifies its coals into three categories—hard coal (bituminous), brown coal, and lignite; the latter two are subbituminous and are mined, for the most part, to fuel the country's thermal electric power stations. Lignite was mined by open pit at the Bukkabrany and the Visonta Mines; the output from these mines was used entirely at the Matra electric powerplant. The mines and the electric powerplant have been owned by RWE/EVS, which was a German consortium (Molnar, 1999, 2001). Resources of subbituminous and bituminous coals in 2001 amounted to about 2,900 Mt and 198 Mt, respectively (Molnar, 2002).

POLAND

Poland was endowed with significant mineral resources, which included bituminous coal; copper and lead and zinc ores; salt; silver; and sulfur. The country's reserve bases of sulfur and copper and sulfur represented about 9% and 6%, respectively, of world totals for these mineral commodities (Edelstein, 2002; Ober, 2002). Resources of coal, salt, and silver also were considered to be of world significance. An inventory of the country's mineral resources for 2001 indicated net gains in geologically documented resources mainly for bituminous coal, kaolin, and construction-grade ceramic clays and construction-grade quartz sand (table 6).

After Russia, Poland was the largest producer of copper in Europe and Central Eurasia in 2001 and remained among the top 10 world producers of copper in terms of mine output (Edelstein, 2002). Poland also continued to be among the world's major producers of nitrogen (in ammonia), salt, silver, and sulfur. In Europe and Central Eurasia, the country was a significant producer of lead and zinc and a leading producer of lime. In 2000 (the most recent available data), Poland accounted for about 2.8% of total world output of bituminous coal (Główny Urząd Statystyczny, 2002a, p. 534-535).

Reflecting global economic doldrums, the slowdown of Poland's economy registered a yearend 1.0% real growth of the gross domestic product compared with that of 2000 (4.0%). Industrial production showed a slight decline (0.2%) compared with the 7.1% increase in 2000 (Emerging Europe Monitor, 2002b, p. 4-5). The gross output of industry represented about 22% of the GDP compared with 24% in 2000. The mining and quarrying sector, which included mineral fuels and processing, accounted for about 5.3% of industrial output. The production of coke and refined petroleum, industrial mineral products, and base metals accounted for about 4.7%, 4.5% and 3.7%, respectively, of total industrial production.

Total sales for the year by the mining and quarrying sector contracted by less than 1.0% compared with those of 2000; sales by the coal, lignite, and peat mining industries, however, increased by about 6% during the same period. The base-metals-producing sector registered about a 17% decrease in sales compared with those of 2000, and sales by the industrial minerals sector decreased by about 3% compared with those of 2000. The coke manufacturing and petroleum refining sectors reported about a 17% decline in sales compared with those of 2000. On balance, total sales in all branches of the minerals industry as a proportion of total sales of industry declined to 18% from 20.9% in 2000 (Główny Urząd Statystyczny, 2002c, p. 66-68).

Government Policies and Programs

The Government of Poland remained committed to privatizing fully the country's iron and steel industry. By 2001, 565 of the 695 mining enterprises had a limited liability status, 77 were joint ventures, 9 were of the partnership type, and 35 remained state-owned (Ministry of Environmental Protection, Natural Resources and Forestry, 2001, p. x). According to Poland's Ministry of the Treasury, which oversees the denationalization of industry, the privatization of the steel industry should create important foreign investment opportunities that would make the industry more competitive (Metal Bulletin, 2000g). Steel trade issues and efforts to restructure and privatize Poland's steel industry continued to be among the leading mineral industry concerns during the year.

Production and Trade

As in 2000, Poland's production of minerals showed mixed results. Cement and crude steel, which were bellwether commodities for the construction and manufacturing sectors of the economy, largely reflected the performance of Poland's economy during the year with declines of about 20% and 16%, respectively, compared with output levels of 2000. Production increases, however, were noted for mined copper (4.5%) and electrolytically refined copper (2.6%), refined lead (4.6%), silver (4%), and zinc (1.9%); cadmium production rose sharply from a very low base in 2000. Copper and especially silver remained important components in the country's mineral export trade. Most industrial minerals registered production shortfalls; the production of mineral fuels, however, generally kept pace or exceeded production levels of 2000 (table 5).

Poland's trade returns for 2001 for selected mineral commodities largely registered import increases compared with those of 2000. Import declines were reported for iron ore and concentrate and crude petroleum (table 7). Mineral export results in 2001 were more varied. Export increases were noted for aluminum, cadmium (about 200 t in 2001 from 0 t in 2000), steel semimanufactures, refined silver, and refined zinc. Substantial export declined were reported, however, for copper and copper products and pig iron. Among industrial minerals and mineral fuels, exports of coal, cement, salt, and sulfur fell compared with those of 2000; those of glass, coke and semicoke, and refined petroleum showed increases (table 8).

Commodity Review

Metals

Cadmium.—In 2001, Poland's production of cadmium reached about 330 t, which was its highest level in more than 5 years. Owing to its strong association with sphalerite, cadmium in Poland was produced as a byproduct of the lead and zinc mining and processing operations in the Silesia-Cracow region. A new zinc rectifier, which was built in 1999 at the Misateczko Slaskie smelter and an installation for refining zinc-cadmium wastes went into full production during the year. About 6 t of cadmium was produced in 2000 (Ministry of Environmental Protection, Natural Resources and Forestry, 2002, p. 65-77).

Copper.—All copper ore in Poland was mined by Kombinat Gorniczo Hutniczy Miedzi (KGHM) Polska Miedz S.A., which was a major world copper mining, beneficiation, smelting, and refining complex in the Lubin area and accounted for more than 3% of world copper production. The ore was worked (room and pillar) at the Lubin, Polkowice-Sieroszowice, and Rudna Mines at depths that ranged from 600 to 1,200 m (about 1,900 to 3,700 feet). Chalcolite is the principal mineral in the ore; smaller amounts of bornite and chalcopyrite also are present. The mineralization is mainly in the shale horizon, but it also extends into the overlaying carbonate and underlaying sandstone layers. As of December 31, ore resources under exploitation amounted to more than 1.5 Gt that contained about 35 Mt of copper (table 6). Ore grades have ranged from 1.37% (Lubin Mine) to 2.58% (Polkowice-Sieroszowice Mine). Two varieties of concentrate are produced at Rudna (28% copper) and Polkowice (25% Cu). Total reserves amounted to about 2.4 Gt that contains about 48 Mt of metal (table 2; Mining Journal, 1999).

The Rudna Mine has the largest production capacity, which amounts to about 13 Mt/yr of ore. The concentrator at Rudna processes Rudna ores, as do some ores from the Polkowice-Sieroszowice Mine; its capacity was rated to produce about 700,000 metric tons per year (t/yr) of concentrate. Output by the Polkowice-Sieroszowice Mine and concentrator amounts to about 9.2 Mt/yr of ore and 450,000 t/yr of concentrate. The Lubin Mine accounts for about 7 Mt/yr of ore to produce about 465,000 t/yr of concentrate (Ministry of Environmental Protection, Natural Resources and Forestry, 2002, p. 128-129).

In 2001, Poland's production of copper (in ore) increased by about 4% compared with that of 2000. Similarly, copper recovered in concentrate increased by about 5%, and primary smelter copper production, by about 2%. The output of secondary smelter copper registered a substantial increase of about 42% to about 28,000 t from about 18,000 t in 2000. The total output of electrolytically refined copper (primary and secondary) increased by about 2.6% compared with that of 2000. Trade data for 2001 show that Poland's net exports of unwrought refined copper and copper alloys amounted to 233,400 t and were valued at about $372 million (Główny Urząd Statystyczny, 2002b, p. 147, 537). In order of volume, France, Germany, China, and Austria were the principal importers of copper from Poland in 2001. China's imports of copper from Poland amounted to about 35,000 t, which was an increase of about 46% compared with imports in 2000 and about 75% compared with those of 1998. In 2001, Poland's apparent consumption of refined copper amounted to about 272,000 t, which was an increase of about 11% compared with that of 2000 (Ministry of Environmental Protection, Natural Resources and Forestry, 2002, p. 132-133).

Major developments in 2001 involved a KGHM proposal that would merge the Lubin, Polkowice-Sieroszowice, and Rudna Mines into a single mining division and its two smelter/refineries into a separate operational division. The proposal's aim was to optimize operations from the company's top management down to the mining, smelting, and refining level (Metal Bulletin, 2001r).

Gold.—In 2001, Poland's gold production continued to be based almost entirely on the country's copper mining operations. The gold content of the copper concentrates produced by KGHM were reported to be about 1 gram per metric ton (Ministry of Environmental Protection, Natural Resources and Forestry, 2002, p. 197-199). Byproduct gold produced at KGHM's copper refineries declined by about 4% in 2001 compared with that of 2000. The gold was recovered at KGHM's 550-kilogram-per-year precious metals plant (Boliden, Klado method), which was a division within the Glogow smelter and refinery. The amount of gold recovered at Glogow varied with changes in the proportion ores produced at the three mines, each of which had a different average gold content. Poland's domestic consumption of gold in recent years has been in the range of about 260 to 365 t/yr.

Iron and Steel.—In 2001, such bellwether commodities as pig iron and crude steel showed considerable contraction of output as each commodity declined by 16% compared with its respective production level in 2000. The production of hot-rolled steel declined by 12%. Poland depended entirely on imported iron ores and concentrates, as well as on chromite, manganese, and titanium, to produce the ferroalloys that were needed by the steel industry.

In 2001, investor interest in Poland's steel industry by foreign, mainly West European, investors was heightened. ThyssenKrupp Materials AG of Germany negotiated the acquisition of 80% of shares of stock of Poland's metallurgical products distributor (ferrous and nonferrous metals) Energostal S.A. The deal was finalized in June; the company was given a new name—ThyssenKrupp Energostal S.A. ThyssenKrupp Energostal incorporated an important portion of Poland's metal products distribution, services, and storage sector with that of the EU (Metal Bulletin, 2001ag).

In the early part of the year, such Western European Steel producers as Rautaruuki Oy of Finland and VA Stahl (Voest-Alpine AG) of Austria expressed interest in the developing privatization program for Poland's steel industry. The privatization program encompassed the following enterprises: Huta Cedler S.A. (rolling mill/wire rod, bars, angles, etc; cold-rolled hoop and strip), Huta Florian S.A. (rolling mill, mainly cold-rolled section), Huta Katowice S.A. (integrated steelworks/pig iron and crude and carbon steels), and Huta im Tadeusza Sendzimira S.A. (integrated steelworks/pig iron carbon and nonstainless alloy steels) (Metal Bulletin, 2001l). In March, however, VA Stahl withdrew as an interested party from the program, reportedly owing to internal consolidation at Voest-Alpine and to proposed mergers under consideration in other parts of Europe (Metal Bulletin, 2001ao).

By midyear, the early bids by Rautaruuki and several other steel interests fell short of the Government's sale provisions. The remaining interested investors were Ispat International of the United Kingdom and a consortium that comprised the Arbed Group of Belgium-Luxembourg, ThyssenKrupp AG of Germany, and the Usinor Group of France. Poland's privatization program was partly designed to harmonize the country's steel industry with the EU's regulations that govern state subsidies, production restructuring, and capacity limits (Protocol 2 of the Europe Agreement, based on European Coal and Steel Community guidelines). The four Polish steel plants offered for privatization were to rationalize their operations and to reduce their output capacities in accordance with these regulations to maintain the country's candidate status for accession in 2004 (Metal Bulletin, 2001a, h). Huta Katowice S.A. was in financial difficulty with reported debts that amounted to about $95 million and losses of about $24 million in the third quarter. Blockage of Huta Katowice's main accounts by lending banks complicated the plant's operations at midyear (Metal Bulletin, 2001q). Activities at Huta im. T. Sendzimira S.A., mainly were focused at implementing the company's second modernization phase that followed a final credit agreement with Government guarantees of 50% of a loan worth about $203 million. Equipment for the modernization was to be supplied by Voest-Alpine AG and would include two walking beam furnaces, two downcoilers, and a reversing rougher (Metal Bulletin, 2001ad).

The rationalization program at Huta Czestochowa S.A. involved the closure of the company's blast furnace and its two remaining open hearth furnaces. Steel would be produced in a Danieli electric arc furnace that was installed in 1997. Huta Czestochowa, however, was not yet ready to be offered for privatization (Metal Bulletin, 2001p). To assure the continued success of its efforts to privatize the steel industry, the Government of Poland promulgated "Update 2001—Iron and Steel Restructuring Program," which adjusted the Government's privatization plan for the steel industry to allow "Polish steel products to become viable while respecting open market rules." The full legal basis for the restructuring program was the Iron and Steel Restructuring Act, which was passed by Poland's Parliament in August (Ministry of Environmental Protection, Natural Resources and Forestry, 2002, p. 239-249).

Stalexport Zaptor S.A., which was a major Polish metal-trading-and-processing company, and owner of steel producers Huta Szczecin S.A., Huta "Ostrowiec" S.A., and P.P. Huta "Labedy," initiated a selloff of these assets in 2001. Financial losses, which began soon after the acquisition of these assets in the late 1990s rose to a debt of about $160 million. In midyear, Stalexport sold the cast iron-producing section of Huta "Ostrowiec," SOR, to Centrozap SA (a metals processor and trader) with primary interests in iron and steel. Later in the year, Statexport planned to sell of its pig iron producer Huta Szczecin to Centrozap and to find buyers for Huta "Ostrowiec" and Huta "Labedy" (Metal Bulletin, 2001aa).

Other important issues included a ruling by the appellate unit of the WTO that upheld the decision by that organization in 2000, which specified that Thailand's antidumping actions against Poland's steel exports was in violation of WTO rules (Metal Bulletin, 2001aq). This issue arose in 1997 with respect to steel exports from Huta Katowice SA to Thailand. Thai trade officials alleged the dumping of steel by Huta Katowice. The company appealed the charges, pointing out that the steel, which Thai officials claimed cost $500 per metric ton to produce and that which they claimed was sold on the Thai market for $265 per ton, actually represented two different steel products (Reuters Limited, 1997).

Lead and Zinc.—Poland was a major European producer of lead and zinc ore. Although mine production of lead and zinc increased slightly in 2001, compared with that of 2000, the production of total refined lead increased by about 18% and that of zinc, by about 1% (table 5).

Lead and zinc ore is mined in the southeastern part of the country in the Silesia-Cracow region at two underground mines. The Olkuz-Pomorzany Mine, which is located near Olkusz and was part of the ZGH Boleslaw operation, produced ore that graded about 1.69% lead and 4.2% zinc; and the Trzebionka Mine and concentrator at Trzebionka produced ore that graded 1.67% lead and 3.4% zinc. The volume of mine production of lead (lead in ore) increased by about 7% compared with that of

2000; that of concentrates (lead content), by about 13%. The volume of mine output of zinc, however, declined by about 5%; that of concentrates, by about 3%. The decline in zinc mine production was attributed mainly to depletion of the ore (Ministry of Environmental Protection, Natural Resources and Forestry, 2002, p. 258-299, 495).

Poland's total smelter lead capacity was rated at about 85,000 t/yr. In 2001, the total output of smelter lead amounted to slightly more than 70,000 t, of which primary smelter lead production constituted about 44% of total production; the balance was accounted for by secondary sources of lead. Secondary lead production was centered largely at smelters operated by Baterpol Ltd., Huta Cyncu Miasteteczko Śląskie, and KGHM. In 2001, Baterpol Ltd acquired the lead smelting and refining operations of Huta Metali Niezelaznych "Szopienice" (Ministry of Environmental Protection, Natural Resources and Forestry, 2002, p. 258-299, 495).

Poland produced smelter refined zinc (about 46%) and a larger amount of electrolytically refined zinc (about 54%). Owing to declining mine production of zinc, imports of sphalerite and sphalerite-galena concentrates have been increasing. In 2001, total imports of zinc and zinc-lead concentrates, in terms of gross weight, amounted to about 118,000 t, an increase of about 24% compared with those of 2000. The main suppliers of zinc concentrates to Poland were, in descending order, Romania, Canada, and Honduras (Ministry of Environmental Protection, Natural Resources and Forestry, 2002, p. 258-299, 495).

In 2001, the net value of exports of unwrought lead amounted to about $1.8 million. In order of volume, Germany, the United Kingdom, and the Czech Republic were the chief importers of lead from Poland. With respect to the value of lead imports of lead, Sweden, Kazakhstan, and Germany (in descending order) were the main suppliers of unwrought lead to Poland. The net export value of unwrought zinc amounted to about $71.6 million; the major importers of unwrought zinc were, in descending order, Germany, the Czech Republic, and Slovakia (Główny Urząd Statystyczny, 2002b, p. 147, 548).

Silver.—In 2001, Poland, which was among the major world producers of silver, accounted for about 7% of world mine production (Hilliard, 2002, p. 151). Copper and, to a lesser extent, lead and zinc mining were Poland's domestic sources of primary silver. The country's copper mining, smelting and refining complex in the Lubin area, which was operated by KGHM, produced about 98% of the country's byproduct silver, which amounted to 1,163 t in 2001. Poland's exports of silver in 2001 amounted to 1,094 t and had a net value of about $155 million. The top three importers of Polish silver were, in descending order, the United Kingdom, Germany, and Belgium (Główny Urząd Statystyczny, 2002b, p. 147, 513).

Industrial Minerals

Poland produced a broad range of industrial minerals that included calcareous and silicate rocks and aggregates, clays, feldspar, gypsum, magnesite, salt, and sulfur, which served the needs of the country's chemical and construction industries. Poland remained among the leading world producers of lime, nitrogen (in ammonia), salt, and sulfur (Kostick, 2002; Kramer, 2002; Miller, 2002; Ober, 2002).

Sulfur.—Poland's sulfur production capacity was effectively reduced by about 1 Mt/yr with the closure of the Gasworks Mine in late 2001. The Gasworks Mine, which had worked the Gasworks-Grab-Wydzra sulfur deposit since 1967, was owned and operated by state-owned Kopalnie i Zaklady Przetworcze Siarki "Siarkopol." Poland's remaining native sulfur mine was the Osiek Mine, which, like the Gasworks Mine, used a Frasch extraction technique, had a design capacity of 800,000 t/yr of sulfur. Osiek Mine's management was developing plans to increase production capacity to 1.3 Mt/yr in a Phase II expansion program (Fertilizer Week, 2001).

In 2001, Poland's production of native sulfur declined by about 31%, and that of total sulfur (native plus byproduct), by about 37% compared with that of 2000. The volume of sulfur exports in 2001 declined by 24% compared with that of 2000 (Ministry of Environmental Protection, Natural Resources and Forestry, 2002, p. 450-455).

Mineral Fuels

Coal.—Poland, which remained a significant world producer of coal, accounted for about 3.1% of the world's output of bituminous coal and about 6.9% of the world's total output of lignite (Główny Urząd Statystyczny, 2002a, p. 492). In 2001, the country's production of bituminous coal and lignite amounted to about 104 Mt and 60 Mt, respectively; these were virtually the same levels of production as those of 2000. The country's net exports of coal amounted to about 21.1 Mt, which was a decline of about 2.8% compared with net exports of 2000. In order of volume, Germany, Austria, and Finland were the major importers of Polish coal (Główny Urząd Statystyczny, 2002b, p. 188).

Poland's bituminous coal was mined in three basins of Late Carboniferous age. The Upper Silesian, Lower Silesian, and Lublin basins have exploitable resources that amounted to 45,900 Mt of coal in 132 deposits. The Upper Silesian basin represented the major portion of the country's total reserves with about 80% of the total in 114 deposits (Ministry of Environmental Protection, Natural Resources and Forestry, 2002, p. 217-218).

In 2001, the World Bank for Reconstruction and Development agreed to provide the Government of Poland a $100 million loan to help finance Poland's Hard Coal Reform Program; this was the second phase of a reform plan that called for streamlining the industry with closures of unprofitable mines and workforce reductions and retraining (Metal Bulletin, 2001ab; World Bank for Reconstruction and Development, 2001, p. 14).

Natural Gas and Petroleum.—The production of natural gas increased by about 4%, and that of petroleum, by about 17% compared with respective output levels in 2000. Poland depended on imports to meet its needs for oil and gas. In 2001, Poland's imports of petroleum declined to 17,513,000 t, or by about 3% compared with those in 2000. Poland's imports of natural gas, however, increased by about 8%. Russia remained Poland's chief source of supply of both hydrocarbons, which supplied about 85% and 95%, respectively, of Poland's imports of natural gas and petroleum in 2001 (Ministry of Environmental Protection, Natural Resources and Forestry, 2002, p. 177, 325).

Exploration activity for hydrocarbons during the year included the Government's initiation of a third round of bidding for 17 exploration blocks in the central and northwestern parts of Poland. In 2000, the Government awarded 15 exploration locks in the southeastern part of the country; EuroGas Inc. of the EU obtained 10 of the 15 exploration blocks (Oil & Gas Journal, 2001a, p. 37). In February, gas production began at the Kleka 11 well. The initial rate of production was 2 million cubic feet per day but was expected to reach 4 million cubic feet per day by 2003. Polish Oil & Gas Co. owned 52% of Kleka 11; the balance was owned by Fx Energy Inc. of the United States (Oil & Gas Journal, 2001b, p. 44). Other issues relative to the natural gas and petroleum sector included the continuing formal discussion concerning the diversification of Poland's supply of natural gas. The EU's accession requirements for applicant countries stipulate that natural gas imports must come from at least two different sources. To meet this requirement, Poland's oil and gas authorities held talks were held with Danish and Norwegian commercial interests (Alexander's Oil & Gas Connections, 2001a). In early 2001, Poland approved a route for a new gas pipeline that would carry Russian gas to Western Europe. The new gas pipeline was to be in addition to the Yamal gas main that carried Russian gas through Poland (Alexander's Oil & Gas Connections, 2001b).

SLOVAKIA

Slovakia continued to be a modest regional producer of a variety of minerals. Aluminum and steel production formed the dominant elements in the country's metals sector. Steel production largely was based on imported raw materials, and that of aluminum was based entirely on imported bauxite and alumina. Small quantities of copper, gold, lead, and zinc also were produced. Industrial minerals production included barite, clays, magnesite, and salt. Slovakia's production of mineral fuels composed brown coal and lignite and minor quantities of gas and petroleum (table 10).

The economy of Slovakia continued to develop towards a full market system. The need to denationalize the state's commercial assets and to reduce subsidies to the public sector expeditiously often was tempered by policies promulgated to maintain social stability that often resulted in increased public sector employment and uneven economic performance. In 2001, Slovakia's GDP increased by 3.3% (constant prices) compared with that of 2000. Industrial production in 2001 continued to show recovery with a growth rate of 6.8% compared with that of 2000 (Emerging Europe Monitor, 2002c).

Slovalco was Slovakia's sole producer of primary aluminum. The enterprise, which was originally known as ZSNP Aluminum Works, was put into full operation in 1953. Following the restructuring of ZSNP's assets in 1993, Slovalco became a subsidiary of ZSNP and was solely involved in primary aluminum production. After 1993, Slovalco began a program of modernization and facility expansion that garnered investment capital from the European Bank for Reconstruction and Development (EBRD) and Hydro Aluminium AS of Norway. Hydro and EBRD acquired 14.5% and 10% of Slovalco's shares, respectively; the balance remained with ZSNP (Slovalco, 2000, p. 5-8). In 2001, following an agreement among the Slovalco's shareholders, Hydro and EBRD acquired the majority of Slovalco's shares; each received 40% of total shares of stock. ZSNP was to retain ownership of 20% of Slovalco's shares of stock. A provision in the transaction gave Hydro the option of acquiring EBRD's shares if exercised by yearend 2006. This transaction also allowed ZSNP to restructure its bank debts. Planned facility expansion at Slovalco included the addition of 54 new reduction cells to that would raise capacity by 37,000 t/yr to 146,000 t/yr by 2003. Other modernization programs were expected to raise production capacity at Slovalco to 155,000 t/yr by 2004. Casthouse products that used primary and secondary aluminum also were expected to reach a 178,000-t/yr production level in 2004 (Metal Bulletin, 2001k).

The major portion of Slovalco's production was designated for exports. In 2000 (the latest year for wich data were available) sales of finished aluminum during 2000 to have amounted to 141,562 t (5% compared with those of 1999), of which 85.6% was exported. Exports to the EU accounted for 61.7% of total exports of aluminum. The marketed product mix was billets, 69.8%; primary foundry alloys, 25.85%; wire rod, 3.66%; and liquid metal 0.69% (Slovalco, 2000, p. 9). In 2000, Slovalco invested approximately $3.9 million mainly for renovation and streamlining production processes and for health and safety improvements (Slovalco, 2001, p. 9).

Slovakia's only gold mining operation at Banská Hodruša was terminated in mid-2001. Slovenská banská spol. s.r.o., which mined the Svetozár gold ore deposit, ended production mainly because of depletion but also owing to a lack of working capital needed for exploration work (Balaz, 2002). Mined gold amounted to about 157 kilograms, or about 51% of that produced in 2000.

The cost of Slovakia's mining and pelletizing its iron ore was reported to be high and quickly increasing; the cost of roasting the siderite ore (30% iron) constituted about 40% of the value of pellet production. To reduce costs, the management of ELBA a.s., which was the country's sole mine producer of iron ore and was located at Spišska Nová Ves, sought to obtain credit during the year to redesign the pellet production line and to replace its rotary kilns with operationally less costly shaft furnaces. The output of iron pellets and concentrate declined by about 3% compared with that of 2000; it declined by about 2% in 2000 compared with that of 1999 (Balaz, 2002). Production of iron ore concentrate and pellets from domestic sources in 2001 was about 3% less than that of 2000 and satisfied less than 10% of the country's industrial needs. Slovakia's total resources of siderite amounted to about 97 Mt of which ore reserves totaled to about 26 Mt. Russia and Ukraine were Slovakia's main suppliers of iron ore and concentrate. Slovakia's imports from Russia and Ukraine in 2000 amounted to about 4.74 Mt. In terms of value, Russia and Ukraine supplied Slovakia with about 59.7% and 39.4% of its iron ore needs, respectively (Balaz and others, 2001, p. 57-58).

Having acquired the steelmaking portion of VSZ Kosice (VSZ) in 2000, USX Corp. of the United States reported plans to raise its stake in VSZ to 80% from 25%. Final decision on this proposal, however, was to await the outcome of the due diligence report. Despite the loss of its steel-producing enterprise, VSZ continued to operate companies that serviced and maintained the steel-producing enterprise and organized its sales (Metal Bulletin, 2001al). Other developments in the steel sector included a report on a fivefold increaseof profits by Zeleziarne Ṕodbrezova a.s., which was was expected to produce more than 250,000 t of hot- and cold-rolled pipes in 2001 (Metal Bulletin, 2001ac).

Production declines of 10% and 4.6% were noted for petroleum and coal, respectively, compared with their output levels in 2000. Natural gas production increased by about 5%. Russia, which remained Slovakia's chief supplier of natural gas and petroleum, accounted for more than 98% of the country's imports of these fuels.

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TABLE 1
CZECH REPUBLIC: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1997	1998	1999	2000	2001
METALS						
Aluminum, secondary e/		45,000	45,000	40,000	40,000	20,000
Copper, refined, secondary e/		20,000	20,000	23,037	20,000	18,000
Gold metal	kilograms	--	--	3,207	3,000	2,000
Iron and steel:						
Iron ore:						
Gross weight	thousand tons	28	26	23	21	20 3/
Fe content e/		8,000	7,000	6,000	6,000	6,000
Metal:						
Pig iron	thousand tons	5,195	4,982	4,022	4,621	4,677 3/
Ferroalloys, total electric furnace e/	do.	1	1	1	1	1
Steel, crude	do.	6,495	6,498	6,107 r/	6,216	6,316 3/
Semimanufactures	do.	10,017	10,205	10,207	11,637	12,645 3/
Lead, metal, secondary		20,000	20,000	29,280	25,000 r/	25,000
Silver		--	--	24	25	25
Uranium, mine output, U content		624	611	605	498	500
Zinc: e/						
Mine output:						
Ore (Pb-Zn), gross weight		--	--	--		
Zn content of ore		--	--	--		
Concentrate, gross weight		--	--	--		
Zn content		--	--	--		
Metal, secondary		1,000	1,000	145	150	250
INDUSTRIAL MINERALS						
Cement, hydraulic	thousand tons	4,877	4,604	4,241	4,093	3,550 3/
Clays:						
Bentonite	do.	110	125	160	280	250
Kaolin	do.	2,982	3,049	5,183	5,573	6,300
Other	do.	759	1,030	1,070	1,120	1,350 3/
Diatomite		42,000	35,000	37,000	34,000	34,000
Diamond, synthetic e/	carats	5,000	5,000	5,000	5,000	5,000
Fertilizer, manufactured:						
Nitrogenous, N content		250,000	247,000	220,000	257,000	250,000
Phosphatic, P_2O_5 content		400,000	80,000	100,000	100,000	100,000
Potassic, K_2O content		20,000	20,000	20,000	20,000	20,000
Mixed		500,000	100,000	77,000	75,000	75,000
Feldspar		243,000	266,000	244,000	337,000	410,000 3/
Gemstones, crude, pyrope-bearing rock		49,000	43,000	54,000	62,000	60,000
Graphite		25,000	28,000	22,000	23,000	23,000
Gypsum and anhydrite, crude		241,000	222,000	136,000	82,000	80,000
Lime, hydrated and quicklime	thousand tons	1,217	1,151	1,142	1,202	1,200
Nitrogen, N content of ammonia e/		250,700	250,000	250,000	250,000	250,000
Quartz		13,000	1,000	3,000	--	--
Salt e/		--	--	--	--	--
Sand and gravel:						
Common sand and gravel	thousand cubic meters	11,727	9,279	12,781	12,640	12,000
Foundry sand	thousand tons	769	815	717	829	700
Glass sand	do.	994	827	980	985	960 3/
Stone:						
Basalt (for casting)		103,000	96,000	89,000	14,000	15,000
Dimension stone	thousand cubic meters	258,000	305,000	300,000	320,000	280,000 3/
Limestone and other calcareous stones	thousand tons	11,304	11,558	11,703	11,808	11,800
Building stone	thousand cubic meters	10,845	9,528	9,442 r/	9,451 r/	9,000
Sulfur, byproducts, all sources e/		40,000	40,000	40,000	40,000	40,000
Sulfuric acid		333,000	327,000	350,000	350,000	350,000

See footnotes at end of table.

TABLE 1--Continued
CZECH REPUBLIC: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1997	1998	1999	2000	2001
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Bituminous	thousand tons	20,847	19,521	17,227	17,028	17,500
Brown and lignite	do.	58,142	51,953	45,370	51,063	51,000
Coke	do.	2,916	4,009	3,340	3,411	3,500
Fuel briquets from brown coal	do.	600	325 r/	288	253	250
Gas:						
Manufactured, all types e/	million cubic meters	800	800	800	800	800
Natural, marketed 4/	do.	118	137	143	118	115
Petroleum:						
Crude:						
As reported	thousand tons	159	172	176	168	160
Converted	thousand 42-gallon barrels	1,080	1,167	1,197	1,142	1,100
Refinery products e/	do.	27,000	35,000	35,000	35,000	35,000

e/ Estimated. r/ Revised.

1/ Table includes data available through March 2003. In addition to the commodities listed, arsenic, dolomite, illite, sodium compounds, sulfuric acid, talc, and zeolite are produced, but information is inadequate to make reliable estimates of output levels.

2/ Produced as a byproduct from noncopper ores.

3/ Reported figure.

4/ Includes gas produced from coal mines; gross output of natural gas is not reported, but is believed to exceed reported marketed output by an incosequential amount.

TABLE 2
CZECH REPUBLIC: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies	Location of main facilities 1/	Annual capacity
Bentonite		Keramost a.s.	Most	150
Cement		Bohemia, Cizkovice, Hranice, Karlov Dvor, Lochkov Pracovice, and Velary	Bohemia	3,500
Do.		Bystre, Malomerice, Mokra, Ostrava-Kunice, and Zahorie	Moravia	2,800
Clay, koalin		Mines in Karlovy vary area	West Bohemia	450
Do.		Mines in Plzen area	Central Bohemia	150
Coal:				
Bituminous		Mines in OKD coal basin	Ostrava-Karvina, north Moravia	22,100
Do.		Mines in KD coal basin	Kladno, central Bohemia	3,000
Brown		SHD administration	Most, northwest Bohemia	61,000
Do.		HDB administration	Sokolov, west Bohemia	17,000
Lignite		JLD administration	Hodonin, south Moravia	5,000
Copper, ore		Zlate Hory	North Moravia	300
Graphite		Grafit a.s.	Netolice	35
		Rudne doly Stare Mesto-F s.r.o.	Stare Mesto	
Mica		GARMICA s.r.o.	Netolice	5
Lead-zinc, ore		Horni Benesov and Zlate Hory	do.	400
Lead, metal, secondary, refined		Kovohute Pribram	Pribram	26
Natural gas	billion cubic meters	Gasfields around Hodonin	South Moravia	25
Petroleum:				
Crude		Oilfields around Hodonin	do.	160
Refinery	thousand barrels per day	Kolin, Kralupy, Pardubice, and Litvinov	Bohemia	200
Steel, crude		Nova Hut s.p. (Ostrava)	Kunice-Ostrava	3,800
Do.		Zelezarne Vitcovice	Vitkovice-Ostrava	900
Do.		Trinecke Zelezarny (Trinecke Iron and Steel Workss)	Trinec	3,000
Do.		Poldi United Steel Works	Kladno-Prague	1,700
Do.		Zelezarny Bila Cerkev	Hradek-Rokycany	300
Do.		Zelezarny Veseli, a.s.	Veseli and Moravou	300
Do		Zelezarny Chomutov s.p.	Chomutov	350
Do		Bohumin Iron and Steel Works	Bohumin	400
Titanium dioxide		Precheza A.S	Precheza	25
Uranium		DIAMO s.p.	Straz pod Ralskem	2

NA Not available.

1/ Names and locations of mines and crude oil refineries are identical.

TABLE 3
HUNGARY: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity 3/		1997	1998	1999	2000	2001
METALS						
Aluminum:						
Bauxite, gross weight	thousand tons	743	909	935	1,046	1,000 4/
Alumina, gross weight, calcined basis	do.	76	138	295	357 r/	300
Metal:						
Primary		35,000	35,000	34,000	33,850 r/	35,000
Secondary		63,190	64,000	54,000 r/	55,000	50,000
Total		98,190	99,000	88,000	90,000	85,000
Copper, refined metal, including secondary e/		12,000 4/	12,000	12,000	12,000	12,000
Gallium, mine output metal content	kilograms	--	--	--	--	--
Iron and steel, metal:						
Pig iron	thousand tons	1,190	1,258	1,309	1,340	1,300
Ferroalloys e/ 5/		8,000	8,000	8,000	8,000	8,000
Steel:						
Crude	thousand tons	1,829	1,940	1,813	1,969 r/	2,056 4/
Semimanufactures, rolled only	do.	2,229	2,346	1,954	1,900	1,900
Manganese ore:						
Run of mine:						
Gross weight		57,000	34,000	41,000	41,000 r/	43,000 4/
Mn content e/		14,000	8,900 r/	11,000 r/	11,000 r/	11,500
Concentrate:						
Gross weight		15,291	15,000 e/	15,000	15,000	15,000
Mn content e/		5,000	5,000	5,000	5,000	5,000
Uranium, U_3O_8 content		200	100	--	--	--
INDUSTRIAL MINERALS						
Cement, hydraulic	thousand tons	2,811	2,999	2,978	3,358 r/	3,500
Clays:						
Bentonite:						
Raw		14,848	20,122	9,301	4,818	5,200 4/
Processed e/		9,000	12,000	6,000	2,000	2,500
Kaolin, raw and washed		10,000	10,000 e/	9,000	7,100 r/	8,000
Gypsum and anhydrite e/		150,000	135,000	222,000	251,000 r/	200,000
Lime, calcined	thousand tons	498	500 e/	500	500 e/	500
Nitrogen, N content of ammonia e/	do.	250	250	250	250	250
Perlite		120,000	130,000	148,000	150,000	151,000 4/
Refractory materials, n.e.s.: e/						
Chamotte products	thousand tons	20	20	20	20	20
Chrome magnesite products	do.	5	5	5	5	5
Sand and gravel:						
Gravel e/	do.	10,000	8,160	10,297	13,490 r/	13,000
Sand:						
Common	thousand cubic meters	284	250 e/	250	300	300
Foundry		72,537	243,000	175,000	173,000	168,000 4/
Glass		327,569	241,434	490,400	340,000 r/	339,000 4/
Stone:						
Dimension, all types e/	thousand tons	5,000	5,000	5,000	5,000	5,000
Dolomite	do.	1,440	1,772	861 r/	787	800
Limestone	do.	4,941	4,802 r/	382 r/	668 r/	700
Sulfur, byproduct, elemental, all sources e/		30,000	30,000	30,000	30,000	30,000
Sulfuric acid		84,463	85,000 e/	80,000	80,000	80,000
Talc e/		500 4/	500	500	500	500
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Bituminous	thousand tons	924	877	738	744 r/	573 4/
Brown	do.	6,552	6,008	5,207 r/	5,670 r/	5,384 4/
Lignite	do.	8,089	7,610	7,696	7,862 r/	8,043 4/
Total	do.	15,565	14,495 r/	13,641	14,276	14,000
Coke, metallurgical e/		650	650	650	650	650

See footnotes at end of table.

TABLE 3--Continued
HUNGARY: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity 3/		1997	1998	1999	2000	2001
MINERAL FUELS AND RELATED MATERIALS--Continued						
Fuel briquets	thousand tons	214	250	250	200	200
Gas, natural, marketed	million cubic meters	4,513	4,300	3,100	3,350 r/	3,280 4/
Peat, agricultural use e/	thousand tons	50	50	50	50	50
Petroleum:						
Crude:						
As reported	do.	1,355	1,258	1,243	1,128 r/	1,059 4/
Converted e/	thousand 42-gallon barrels	9,100	8,400	8,400	7,500	7,000
Refinery products e/ 6/	do.	40,000	40,000	40,000	40,000	40,000

e/ Estimated. r/ Revised. -- Zero.

1/ Table includes data available through March 2003.

2/ Estimated data are rounded to three significant digits; may not add to totals shown.

3/ In addition to the commodities listed, diatomite and a variety of other crude construction materials, such as common clays, are produced, but available information is inadequate to make reliable estimates of output levels.

4/ Reported figure.

5/ Hungary is believed to produce some blast furnace ferromanganese.

6/ Excludes refinery fuel and losses.

TABLE 4
HUNGARY: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity
Alumina	Hungarian Aluminum Industrial Corp. (HUNGALU)	Ajka Timfoldgyar plant, about 120 kilometers southwest of Budapest, near Lake Balaton	400
Do.	do.	Almasfuzito Timfoldgyar plant near the Czech Republic border, 63 kilometers northwest of Budapest	240
Do.	do.	Moson-Magyarovar plant, in northwestern corner of Hungary, about 12 kilometers from Austrian and Czech borders	30
Aluminum, primary	do.	Inota plant, near Varpalota, 75 kilometers southwest of Budapest	46
Bauxite	HUNGALU: Bakony Bauxite Ltd.	Bakony District, extending roughly 100 kilometers northeast along Lake Balaton	1,500
Cement	Belpafatvalvi Cement es Meszipari Rt [Heidelberger & Schwenk (Germany) and Hungarian Group]	Belapatfalva, near Miskolc, 125 kilometers northeast of Budapest	1,100
Do.	Beremend Cement es Meszipari Rt [100% owned by Heidelberger & Schwenk (Germany)]	Beremend, 45 kilometers south of Pecs	1,090
Do.	Dunai Cement es Meszmu Kft [100% owned by Heidelberger & Schwenk (Germany)]	Vac, 50 kilometers north of Budapest	1,200
Do.	Hejocsabai Cement es Meszipari Rt [Holderbank (Germany) and Hungarian Group	Hejoscaba, 150 kilometers northeast of Budapest	1,450
Do.	Labatlani Cementipari kft [100% owned by Holderbank (Germany)]	Labatlan, 20 kilometers north of Tatabanya	550
Clays	Agyag-Asvany Kft [Navan Resources PLC (Ireland)]	Felsopeteny, one underground and two open pit mines and a 5,000-ton-per-year processing plant; products: ball clay, kaolin, and refractory clay	35
Coal:			
Bituminous and lignite	Magyar Szenbanyaszati Troszt (MSZT) (Hungarian Coal Mining Trust)	Tatabanya and Oroszlany coal mining region, 45 kilometers west of Budapest	8,900
Do.	do.	Mecsek coal mining region, near Pecs and Komlo, north of the Yugoslav border	3,100
Do.	do.	Borsod coal mining region, 130 kilometers northeast of Budapest	5,200
Lignite	do.	Thorez opencast mine at Visonta, 80 kilometers northeast of Budapest	7,000

TABLE 4--Continued
HUNGARY: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies	Location of main facilities	Annual capacity
Manganese		Orszagos Erc-es Asvanybanyak (National Ore and Mineral Mines)	Urkut manganese ore mines, 120 kilometers southwest of Budapest	160
Natural gas	million cubic feet	Hungarian Oil and Gas Co. (MOL)	Szeged and Algyo gasfields, southern Hungary	152,000
Do.		do.	Hajduszoboszo gasfields, 180 kilometers east of Budapest	50,000
Do.		do.	Smaller gasfields—Szank, Kardoskut, Bekes, Berefurdo, and others	39,000
Perlite		Perlit 92 Kft [Navan Resources PLC (Ireland) and Hungarian Group]	Open pit mine and processing plant in Palhaza, northeastern Hungary	150
Petroleum:				
Crude	million barrels	MOL	Szeged-Algyo field near Romanian-Yugoslav border (50% of total capacity)	7
Refined	do.	Danube Petroleum Refining Co. (subsidiary of MOL)	Szazhalombatta	55
Do.	do.	Tisza Petroleum Refining Co. (subsidiary of MOL)	Leninavaros	22
Do.	do.	Zala Petroleum Refining Co. (subsidiary of MOL)	Zalaegerszeg	4
Silica		Uveg-Asvany Kft [Navan Resources PLC (Ireland) and Hungarian Group]	Mine and plant at Fehevaresugo	660
Steel		Dunaferr Dunai Vasmu Rt	60 kilometers south of Budapest	1,400
Do.		OAM-Ozdi Acelmuvek Kft	120 kilometers northeast of Budapest	360
Do.		DAM-Diosgyori Acelmuvek es Kereskedelmi Kft	Diosgyoer, 145 kilometers northeast of Budapest	850

TABLE 5
POLAND: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/		1997	1998	1999	2000	2001
METALS						
Aluminum,						
Primary		53,614	54,168	50,974	46,941	44,723
Secondary		2,100	2,700	6,100	3,100	2,900
Cadmium:						
Metal primary		22	--	--	6 r/	330
Oxide		62	61	27	-- r/	--
Copper:						
Ore:						
Gross weight	thousand tons	26,165	27,594	28,395	28,503	30,227
Metal content		464,600	490,892	523,120	525,000	545,000
Concentrate:						
Gross weight	thousand tons	1,660	1,750	1,900 e/	1,755 r/	1,834
Metal content		414,800	436,200	463,200	509,000	532,000
Metal:						
Smelter:						
Primary e/		416,200 r/	412,943 r/	472,084 r/	498,146 r/	500,837
Secondary e/		14,300 r/	19,300 r/	27,300 r/	19,700 r/	27,900
Total 3/		430,500	432,243	499,384	517,846	528,737
Refined, electrolytically, primary and secondary		440,600	446,837	470,494	486,002	498,451
Gold, metal, smelter 3/	kilograms	375 r/	409	489	367	349
Iron and steel:						
Pig iron:						
For foundry use	thousand tons	263	288	197	246 r/	98 e/
For steel production	do.	7,032	5,841	5,036	6,246 r/	5,343
Total		7,295	6,129	5,233	6,492	5,440
Ferroalloys:						
Ferrochromium		6,200	4,200	--	--	--
Ferrosilocomanganese		20,000	15,100	10,000	19,000 r/	20,000
Ferromanganese:		47,500	50,152	100	-- 3/	500
Ferrosilicon		77,300	75,000	62,481	56,000 r	48,600
Other electric furnace ferroalloys		8,500	13,300	2,700	-- r/	--
Total electric furnace		112,000	107,600	75,181	75,000	68,600

See footnotes at end of table.

TABLE 5--Continued
POLAND: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified

Commodity 2/	1997	1998	1999	2000	2001
METALS--Continued					
Iron and steel--Continued:					
Steel, crude:					
From open hearth furnaces thousand tons	1,057	494	379 r/	424 r/	178
From oxygen converters do.	7,531	6,223	5,452	6,794 r/	5,822
From electric furnaces do.	2,994	3,197	3,022	3,290 r/	2,809
Other do.	2	2 r/	1	-- r/	--
Total do.	11,584	9,916	8,854	10,508	8,809
Semimanufactures:					
Hot rolled do.	7,803 r/	6,045 r/	6,433 r/	7,616 r/	6,599
Cold rolled do.	1,842 r/	1,652 r/	1,673 r/	1,826 r/	1,350
Pipe do.	538	500	484	483 r/	440
Lead:					
Pb-Zn ore, gross weight do.	4,938	5,052	5,068	4,500 e/ 3/	4,600
Mine output, Pb content of Pb-Zn ore	68,800	73,814 r/	81,849	67,800 r/	69,600
Mine output, Pb content of Cu ore	42,600	42,600	35,000	46,000 r/	52,000
Total Pb mine content	111,400 r/	116,414 r/	116,849	113,800 r/	121,600
Concentrate, gross weight	84,600	90,400	104,000 e/	84,400 r/	86,400
Pb content	54,800 r/	59,533	62,900 r/	51,200 r/	52,600
Metal:					
Smelter:					
Primary	29,600	28,700	31,000	29,700 r/	30,800
Secondary	43,700	50,500	53,600 r/	46,400 r/	39,500
Total	73,300	79,200	84,600	76,100 r/	70,300
Refined	64,800	64,300	63,985	55,900 r/	66,000
Palladium, average content of slimes e/ 7/ kilograms	12	12	12	12	12
Platinum, average content of slimes e/ 7/ do.	20	20	21	21	20
Selenium	76	67	67	65 r/	65
Silver, refined primary	1,038	1,108	1,100	1,144	1,190
Zinc:					
Mine output, Zn content	182,900	182,349	185,689	182,000 r/	172,300
Concentrate output, Zn content	158,300	157,874	154,800 r/	156,900 r/	152,700
Metal, refined, including secondary	170,600 r/	174,800 r/	178,900 r/	173,000 r/	174,700
INDUSTRIAL MINERALS					
Barite:					
Crude	2,300	--	--	--	--
Beneficiated	600	--	--	--	--
Cement:					
Clinker for cement thousand tons	12,739	11,974	11,678	11,559 r/	9,335
Hydraulic cement do.	15,003	14,970	15,555	15,046 r/	12,074
Portland cement do.	13,824	13,934	14,310	13,802 r/	11,115
Clays and clay products, crude:					
Bentonite	--	24,000	96,000	--	--
Fuller's earth	6,100	5,400	5,000	29,700 r/	29,000
Fire clay thousand tons	199	175	140	153	140
Kaolin:					
Crude do.	262	270	286 r/	344 3/	267
Beneficiated do.	84	82	89	99	129
Diamond, synthetic thousand carats	35	7	--	--	--
Diatomite	1,200	1,531	1,200	1,300 r/	1,000
Feldspar:					
Run of mine,	73,800 r/	26,500	9,000	54,000 r/	69,000
Processed, including imported material	108,100	116,700	120,100	165,200	220,600
Gypsum and anhydrite 5/ thousand tons					
Natural:					
Gypsum rock	900	863	926	997	794
Anhydride	135	166	237	285	300
Total	1,035	1,029	1,163	1,282	1,094
Synthetic gypsum	583	674	860	1,140	1,134
Total gypsum and anhydride	1,618	1,703	2,023	2,422	2,228
Lime, hydrated and quicklime do.	2,516	2,406	2,299	2,192 r/	1,954

See footnotes at end of table.

TABLE 5--Continued
POLAND: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/		1997	1998	1999	2000	2001
INDUSTRIAL MINERALS--Continued						
Magnesite:						
Ore, crude	thousand tons	30,000	38,300	54,800	30,000 r/	23,000
Concentrate	do.	29,600 r/	33,700 r/	38,800 r/	26,100 r/	22,200
Calcined		400	--	--	--	200
Nitrogen, N content of ammonia	thousand tons	1,740 r/	1,299	1,151	1,208 r/	1,169
Salt:						
Rock	do.	791	748	923	841 r/	787
Other	do.	3,188	2,536	2,488	3,466 r/	3,543
Total	do.	3,979	3,284	3,411	4,307	4,330
Sand and gravel, excluding glass sand:						
Aggregates:						
Mine output		67,678	72,073	84,639	88,514	73,107
Processed		61,616	64,192	71,196	73,588	62,634
Foundry sand	do.	1,035	979	905	1,055 r/	1,564
Filling sand	do.	14,155	13,695	11,352	9,298 r/	8,914
Lime-sand brick production sand	thousand cubic meters	799	728	673	718 r/	492
Silica:						
Quartz and quartz crystal, processed		22,900 r/	19,500 3/	23,000 3/	52,200 r/	65,900
Quartzite, refractory, processed		204,600 r/	203,800 3/	171,700 3/	176,700 r/	114,200
Quartz schist		6,518	3,100	--	5,500 r/	5,500
Glass sand processed	thousand tons	1,124	1,375	1,418	1,532 r/	1,423
Glass:						
Construction, flat	do.	426	523	479 r/	427 r/	394
Technical	do.	52	65	64	68 r/	54
Commercial	do.	70	74	79	79 r/	81
Packing	do.	873	918	928	976 r/	993
Sodium compounds, n.e.s.:						
Carbonate (soda ash), 98%	do.	933	983	910	1,018	1,062
Caustic soda (96% NaOH)	do.	718	807	737	394	348
Stone:						
Dolomite, mine output	do.	5,781	5,679	1,861	2,204	1,639
Limestone, mine output for lime	do.	13,136	11,950	12,373	13,858 r/	11,324
Limestone, mine output for non- lime end use	do.	28,705 r/	28,364	28,914 r/	28,257 r/	24,289
Crushed and dimension stone, mine output	do.	20,618	23,113	23,877	24,483 r/	22,466
Sulfur:						
Native, Frasch	do.	1,676 r/	1,345 r/	1,175	1,369	942
Byproduct:						
From metallurgy	do.	256	260	278	279 r/	277
From petroleum	do.	44	60	74	131 r/	162
Total	do.	300	320 r/	352	410 r/	439
From gypsum e/	do.	3 r/	-- r/	-- r/	-- r/	10
Total sulfur	do.	1,979	1,665	1,527	1,779 r/	1,381
MINERAL FUELS AND RELATED MATERIALS						
Carbon black		25,000	22,600	18,700	12,500	15,100
Coal:						
Bituminous	do.	137,793	115,726	111,894	103,331	103,992
Lignite and brown	do.	63,169	62,820	60,839	59,484	59,557
Total	do.	200,962	178,546	172,733	162,815	163,549
Coke, coke oven	do.	10,536	9,944	8,575	8,972 r/	8,844
Fuel briquets, all grades	do.	80	64	50	50	
Gas:						
Natural	million cubic meters	4,836	4,852	4,757	4,956	5,175
Manufactured:						
Town gas	do.	10	8	7	7 r/	6
Coke oven gas	do.	4,414	4,209 r/	3,579	3,905 r/	3,851
Generator gas	do.	400 e/	400	400 e/	400	300
Total	do.	4,824 e/	4,617 r/	3,986	4,112 r/	4,157
Peat, fuel and agricultural	thousand tons	206	243	310	380	325
Petroleum:						
Crude, as reported	thousand tons	289	357	425	653	767
Refinery products 6/	do.	14,885	16,191	16,784	18,695 3/	18,680

See footnotes at end of table.

TABLE 5--Continued
POLAND: PRODUCTION OF MINERAL COMMODITIES 1/

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e/ Estimated. r/ Revised.

1/ Table includes data available through March 2003.

2/ In addition to the commodities listed above, antimony and germanium associated with polymetallic deposits and cobalt and nickel associated with copper ores are produced in quantities that so far have not warranted further recovery.

3/ Reported figure.

4/ Based on official Polish estimates.

5/ Includes building gypsum as well as an estimate for gypsum used in the production of cement.

6/ Includes virtually all major products.

7/ Estimates based on reported platinum and palladium-bearing final (residual) slimes and their average Pt and Pd content from electrolytic copper refining.

TABLE 6
POLAND: RESOURCES OF MAJOR MINERALS IN 2001

			Geologically documented resources		
	Number of deposits				+/- 2000
Commodity	Total	Exploited	Total 1/	Exploited 1/	(percentage)
METALS					
Copper, ore	14	5	2,447	1,529	-1.5
Lead and zinc, ore	21	3	180	41	-1.6
INDUSTRIAL MINERALS					
Raw materials for chemicals:					
Sulfur, native	17	4	502	43	-0.4
Rock salt	20	4	80,389	8,464	-16.5
Barite	5	--	6	--	--
Potassium-magnesium salts	5	1	669	72	--
Raw materials for construction:					
Chalk	186	64	195	47	+1.0
Clay:					
Argillaceous material for construction ceramics	1,208	412	3,997	654	-0.3
Bentonite	8	1	3	1	--
Ceramic clays	28	7	142	11	-0.4
Refractory clays	18	5	57	8	--
Kaolin	14	2	216	84	+3.3
Dolomites	11	4	353	165	-1.0
Feldspar ore	7	2	89	12	--
Gypsum and anhydrite	15	4	269	121	-0.5
Magnesite	6	2	13	7	--
Sand and gravel:					
Filling sand	33	10	4,704	1,207	-0.2
Moulding sand	77	11	353	119	-0.5
Quartz sand for brick and concrete	158	52	727	153	+0.3
Gravel aggregates	4,455	1,598	14,436	3,185	-1.3
Silica:					
Glass sand	30	7	607	140	+0.2
Quartz, veined	7	3	7	6	-1.5
Quartzite, refractory	19	1	16	9	--
Stone:					
Stone for construction and road use	523	211	8,076	3,897	-0.5
Limestone and marl for lime and cement use	178	37	17,385	6,197	-0.4
MINERAL FUELS					
Coal:					
Bituminous	132	45	45,890	16,045	+1.2
Lignite	77	9	13,924	2,077	-0.4
Gas: 2/					
Natural billion cubic meters	244	180	139	118	-2.5
Coal methane do.	44	18	91	12	--
Petroleum	85	72	13	12	-6.0

1/ Million metric tons unless otherwise specified.

Sources: Central Statistical Office of Poland, 2002, Statistical Yearbook of Industry. Polish Academy of Sciences, 2002, Minerals Yearbook of Poland.

TABLE 7
POLAND: IMPORTS OF SELECTED MINERAL COMMODITIES

(Thousand metric tons unless otherwise specified)

Commodity		Quantity 2000	Quantity 2001
METALS			
Aluminum and articles thereof		303	310
Iron ore and concentrate		9,737	7,709
Steel:			
Flat-rolled, nonalloy semimanufactures		1,897	2,535
Stainless and articles thereof		79	84
Pipes and hollow profiles		259	289
INDUSTRIAL MINERALS			
Bentonite		62	65
Feldspar		82	114
Glass		429	466
Graphite		39	52
Mineral fertilizers		1,288	1,426
MINERAL FUELS			
Coal, including briquettes		1,503	1,903
Natural gas	million cubic meters	7,676	8,325
Petroleum		18,002	17,513
Refined petroleum		399	435

Sources: Central Statistical Offiice of Poland, Yearbook of Foreign Trade, 2001 and 2002; Polish Academy of Sciences, Minerals Yearbook of Poland, 1996-2001.

TABLE 8
POLAND: EXPORTS OF SELECTED MINERAL COMMODITIES

(Thousand metric tons unless otherwise specified)

Commodity		Quantity 2000	Quantity 2001
METALS			
Aluminum and articles thereof		216	230
Copper and copper alloys		284	233
Copper manufactures		149	143
Steel:			
Pig iron		138	41
Flat-rolled, nonalloy semimanufactures		2,185	2,219
Pipes and hollow profiles		178	202
Silver	metric tons	1,042	1,094
Zinc		87	92
INDUSTRIAL MINERALS			
Cement		978	897
Glass		598	682
Salt		427	376
Sulfur		1,024	774
MINERAL FUELS			
Coal		23,247	23,032
Coke and semicoke		3,690	3,924
Refined petroleum		2,154	2,523

Sources: Central Statistical Offiice of Poland, Yearbook of Foreign Trade, 2001 and 2002; Polish Academy of Sciences, Minerals Yearbook of Poland, 1996-2001.

TABLE 9
POLAND: STRUCTURE OF THE MINERAL INDUSTRY IN 2001 1/

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity
Aluminum:			
Primary	Huta Aluminium "Konin" S.A.	Konin	52.
Secondary	Zaklady Metalurgiczne "Skawina"	Skawina	20.
	Zaklady Metali Lekkich SA "Kety"	Kety	
	Zaklady Metalurgiezne "Trzebinia"	Trzebinia	
Barite 2/	Kopalnia Barytu "Buguszow" Sp. z.o.o.	Boguszow, Stanislawow	40.
Cement:			
Do.	Zaklady Cementowo-Wapiennicze "Gorazdze" S.A.	Chorula	1,800 clinker, 2,400 cement.
Do.	Cementownia "Ozarow" S.A.	Ozarow	2,200 clinker, 2,400 cement.
Do.	Cementownia "Chelm" S.A.	Chelm	1,440 clinker, 2,640 cement.
Do.	Kombinat Cementowo-Wapienniczy "Warta" S.A.	Dzialoszyn	600 clinker, 1,150 cement.
Do.	Cementownia "Malogoszcz" S.A.	Malogoszcz	1,840 clinker, 1,800 cement.
Do.	Zaklady Cementowo-Wapiennicze "Nowiny" S.A.	Sitkowka	785 clinker, 1,070 cement.
Do.	Cementownia "Strzelce Opolskie" S.A.	Strzelce Opolskie	1,257 clinker, 1,630 cement.
Do.	Kombinat Cementowo-Wapienniczy "Kujawy" S.A.	Bielawy	900 clinker, 1,000 cement.
Do.	Cementownia "Rudniki" S.A.	Rudniki	840 clinker, 1,470 cement.
Do.	Cementownia "Wierzbica" S.A.	Wierzbica	759 clinker, 1,000 cement.
Do.	Cementownia "Nowa Huta" S.A.	Krakow	290 clinker, 1,100 cement.
Do.	Cementownia "Rejowiec" S.A.	Rejowiec	600 clinker, 845 cement.
Do.	Cementownia "Odra" S.A.	Opole	433 clinker, 800 cement.
Do.	Cementownia "Warszawa"	Warszawa (Warsaw)	600 cement.
Do.	Cementownia "Groszowice" Sp. z.o.o.	Opole	304 clinker, 425 cement.
Do.	Cementownia "Polcement-Saturn"	Wojkowice	400 cement
Do.	Cementownia "Wiek"	Ogrodzieniec	710 clinker, 240 cement.
Do.	Fabrika Cementu "Wysoka"	Lazy	304 clinker, 425 cement.
Do.	Cementownia "Wejhorowie"	Wejhorowo	42 clinker, 45 cement.
Coal:			
Anthracite	Zaklad Wydobywczo Przetworczy Antracytu Walbrzych-Gaj	Lower Silesia	200.
Bituminous	Bytomska Spolka Weglowa S.A.	Upper Silesia (9 mines)	140,000.
	Rudzka Spolka Weglowa S.A.	do. (6 mines)	
	Gliwicka Spolka Weglowa S.A.	do. (7 mines)	
	Katowicki Holding Weglowy S.A.	do. (11 mines)	
	Nadwislanska Spolka Weglowa S.A.	do. (8 mines)	
	Rybnicka Spolka Weglowa S.A.	do. (5 mines)	
	Jastrzebska Spolka Weglowa S.A.	do. (6 mines)	
	Seven independent mines	do.	
	Walbrzyskie Kopalnie Wegla Kamiennego	Lower Silesia	
	KWK "Nowa Ruda"	do.	
	KWK "Bogdanka" S. A.	do.	
Lignite	KWK "Belchatow"	Belchatow	75,000.
	KWK "Turow"	Turow	
	KWK "Konin"	Konin	
	KWK "Adamow"	Adamow	
	KWK "Sieniawa"	Sieniawa	

See footnotes at end of table.

TABLE 9--Continued
POLAND: STRUCTURE OF THE MINERAL INDUSTRY IN 2001 1/

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity
Coke	Zaklady Koksownicze im. Powstancow Sl.	Upper Silesia	12,000.
	Zaklady Koksownicze "Przyjazn"	do.	
	Kombinat Koksochemiczny "Zabrze"	do.	
	Huta im. Sendzimira	do. (Krakow)	
	Huta "Czestochowa"	do. (Czestochowa)	
	Zaklady Koksownicze "Walbrzych"	Lower Silesia	
Copper:			
Ore, gross weight (1.2%-2.2% Cu)	Kombinat Gorniczo Hutniczy Miedzi (KGHM) Polska Miedz S.A. [KGHM, S.A.]	Lubin Mine, Lubin-Glogow District	8,760.
Do.	do.	Polkowice-Sieroszowice Mine, Lubin-Glogow District	12,775.
Do.	do.	Rudna Mine, Lubin-Glogow District	15,440.
Concentrate, gross weight (25.2%-25.9% Cu)	do.	Lubin beneficiation plant, Lubin-Glogow District	465.
Do.	do.	Polkowice beneficiation plant, Lubin-Glogow District	450.
Do.	do.	Rudna beneficiation plant, Lubin-Glogow District	700.
Metal, refined	do.	Refineries at Glogow I, Glogow II, and Legnica	480.
Feldspar	Strzeblowskie Kopalnie Surowcow Mineralnych	Mine at Sobotka, Lower Silesia, workings at Pagorki Zachodnie and Pagorki Wschodnie	50.
Ferroalloys:			
Electric furnace (FeSiMn, FeMn, FeCr, FeSi)	Huta "Laziska" S.A.	Upper Silesia at Laziska Gome	170.
Blast furnace (FeMn)	Huta "Pokoj" S.A.	Upper Silesia, Ruda Slaska	90.
Gold kilograms	KGHM "Polska Miedz" S.A.	Refinery at Glogow "Trzebinia"	550.
Gypsum and anhydrite	Zaklady Przemyslu Gipsowego "Dolina Nidy"	Southeastern Poland, Gacki	1,400.
	Zaklad Gipsowy "Stawiany"	Southeastern Poland, Szarbkow	
	Kopalnia Anhydrytu "Nowy Lad"	Lower Silesia, Niwnice	
	KGHM "Polska Miedz" S.A.	Lower Silesia, Iwiny	
Helium million cubic meters	Zaklad Odazotowania Gazu	Western Poland, Odolanow	3.
Kaolin	KSM "Surmin-Kaolin" S.A.	Lower Silesia, Nowogrodziec	50.
Lead-zinc:			
Concentrate	Zaklady Gorniczo-Hutnicze (ZGH) "Boleslaw"	Mines and concentrators at Olkusz and Pomorzany, Bukowno region	60 Pb, 160 Zn.
	Zaklady Gornicze "Trzebionka" S.A.	Mines and concentrator at Trzebinia	
Metal:			
Pb, refined	Huta Cynku "Miasteczko Slaskie"	Refinery at Miasteczko Slaskie	60.
Do.	Huta Metali Niezelaznych "Szopienice"	Katowice	35.
Zn, refined	Huta Cynku "Miasteczko Slaskie"	Imperial Smelter at Miasteczko Slaskie	60.
Do.	Zaklady Metalurgiczny "Silesia" (input from Huta "Miasteczko Slaskie"	Refinery at Katowice	(30).
Do.	Zaklady Gorniczo-Hutnicze "Boleslaw"	Refinery at Boleslaw	65.
Do.	Huta Metali Niezelaznych "Szopienice"	Katowice	28.
Lime	In order of size:		4,500.
	Zaklady Przemyslu Wapienniczego Trzuskawica	Kieleckie County, Swietokrzyskie Mountains	
	Slaskie Zaklady Przemyslu Wapienniczego Opolwap S.A.	Opole County	
	Zaklady Przemyslu Wapienniczego Bukowa	Kieleckie County, Swietokrzyskie Mountains	
	Kombinat Cementowo-Wapienniczy Kujawy S.A.	Bydgoskie County	
	Zaklady Cementowo-Wapiennicze Gorazdze S.A.	Opole County	
	Zaklady Cementowo-Wapiennicze Nowiny	Kieleckie County	

See footnotes at end of table.

TABLE 9--Continued
POLAND: STRUCTURE OF THE MINERAL INDUSTRY IN 2001 1/

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity
Lime--Continued:	Produkcyjno-Handlowo-Uslugowe Wapmo-Sabinow	Czestochowa County	
	Wojcieszowskie Zaklady Przemyslu Wapienniczego Sp. z o.o.	Jeleniogorskie County	
	Zaklady Przemyslu Wapienniczego w Sulejowie	Piotrkowskie County	
	Zaklad Wapienniczy w Plazie	Katowickie County	
Natural gas million cubic meters	Ministry of Mining and Energy	Gasfields at pre-Carpathian foothills, Carpathian Mountain Lowlands, near Ostrow Wielkopolski, Poznan, and Trzebnica, north of Wroclaw	4,900.
Nitrogen:			
Ammonia (NH_3)	Zaklady Azotowe "Pulawy" S.A.	Pulawy in eastern Poland	2,400.
	Zaklady Azotowe "Kedzierzyn" S.A.	Kedzierzyn in Upper Silesia	
	Zaklady Azotowe "Wloclawek" S.A.	Wloclawek in central Poland	
	Zaklady Azotowe S.A. w Tarnowie	Tarnow in southern Poland	
	Zaklady Azotowe S.A. w Chorzowie	Chorzow in Upper Silesia	
	Zaklady Chemiezne "Police"	Police in northwest Poland	
Fertilizer (N)	do.	do.	1,700.
Petroleum :			
Crude	Polskie Gornicstwo Naftowe i Gazownictwo Warszawa	Oilfields in northern and northwestern lowlands; sub-Carpathian region and Carpathian Mountains	200.
Do.	Predsiebiorstwo Poszukiwan i Eksploatacji Rpy i Gazu "Petrobaltic"	Baltic Sea Shelf	100.
Refined	"Petrochimia-Plock"	Plock in central Poland	13,500.
	Rafineria "Gdansk"	Gdansk in northern Poland	
	Rafineria "Chechowice"	Czechowice in southern Poland	
	Rafineria "Trzebinia"	Trzebinia in southern Poland	
	Rafineria "Glimar" Gorilice	Gorilice in southern Poland	
	Rafineria "Jedlicze"	Jedlicze in southern Poland	
	Podkarpackie Zaklady Rafyneryjne w Jasle	Jaslo in southern Poland	
Salt, all types	Inowroclawskie Kopalnie Soli S.A.	Gora, Mogilno I, and Mogilno II mines at Inowroclaw in central Poland	6,500.
	Kopalnia Soli "Klodawa"	Klodawa in central Poland	
	Kopalnia Soli "Wieliczka"	Wieliczka in southern Poland, near Krakow, mining deposits at Barycz and Wieliczka	
	Kopalnia Soli "Bochnia"	Southern Poland, mines at the Lezkowice and Siedlec-Moszczenica-Lapczyca deposit; not known to have operated in 1999	
	KGHM "Polska Miedz" S.A.	Sieroszowice in southwestern Poland	
	Kopalnia Wegla Kamiennego "Debiensko"	Debiensko, Upper Silesia	
	Janikowskie Zaklady Sodowe "Janikosoda" S.A.	Janikowo in central Poland	
Selenium	Huta Metali Niezelaznych "Szopienice"	Katowice	80.
	KGHM "Polska Miedz" S.A.	Refinery at Glogow	
Silver	KGHM "Polska Miedz" S.A. Zaklady Metalurgiczne Trzebinia	Refined from dore produced by the Szopienice Pn-Zn smelter-refinery largely from KGHM-supplied slimes	1.
Steel:			
Crude and semimanufactures	Huta Katowice S.A.	Plant at Dobrowa Gornicza, producing pig iron, crude steel, hot rolled- products, and cast stell	14,000 (crude).
	Huta im. T. Sendzimir S.A.	Steelworks at Krakow, producing pig iron, crude steel, hot-rolled products, cold-rolled products, pipes, and cast iron	
	P.P. Huta "Zawierciu"	Steelworks at Zawierciu, producing crude steel, hot-rolled products, cast iron, and cast steel	
	Huta Czestochowa S.A.	Steelworks at Czestochowa, producing pig iron, crude steel, hot rolled sheets, pipes, and cast iron	
	Huta "Ostrowiec" S.A.	Steelworks at Ostrowiec-Swietokrzyski, producing crude steel and hot-rolled products	
	P.P. Huta "Labedy"	Steelworks at Gliwice, producing crude steel, and hot-rolled products	
	Huta "Lucchini-Warszawa" Sp. z o.o.	Steelworks in Warsaw, producing crude steel, hot-rolled products, and cold-rolled strip	

See footnotes at end of table.

TABLE 9--Continued
POLAND: STRUCTURE OF THE MINERAL INDUSTRY IN 2001 1/

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity
Steel--Continued			
Crude and semimanufactures--Continued:	Huta Florian S.A.	Steelworks in Swietochlowicach, producing crude steel, hot-rolled products, galvanized sheet,	
	Huta "Stalowa Wola" S.A.	Steelworks at Stalowa Wola, producing crude steel	
	Huta "Jednosc" S.A	Steelworks at Siemianowice Slaskie, producing crude steel, hot-rolled products, and pipes	
	Huta "Batory" S.A.	Steelworks at Chorzow, producing crude steel, hot-rolled products, and pipes	
	P.P.Huta "Baildon"	Steelworks in Katowice, producing crude steel, hot-rolled products, cold-rolled strip, and cast steel	
	Huta "Malapanew" S.A.	Steelworks at Ozimek, producing crude steel and cast steel	
	Huta "Zabrze" S.A.	Steelworks at Zabrze, producing crude steel, cast iron, and cast steel	
	Huta "Zygmunt" S.A.	Steelworks at Bytom, producing crude steel, cast iron, and crude steel	
Semimanufactures only	Huta Cedler S.A.	Steelworks in Sosnowiec, producing hot-rolled products, cold-rolled strip, and cast iron	
	P.P. Huta "Kosciuszko"	Steelworks at Chorzow, producing hot-rolled products	
	Huta "Pokoj" S.A.	Steelworks at Ruda Slaska, producing hot-rolled products	
	Huta "Andrzej" S.A.	Steelworks at Zawadskie, producing pipes	
	Huta "Ferrum" S.A.	Steelworks in Katowice, producing pipes	
	P.P. Huta "Bobrek"	Steelworks in Bytom, producing pig iron, hot-rolled products and cast iron	
	Huta "Buczek" S.A.	Steelworks in Sosnowiec, producing pipes and cast iron	
	P.P. Huta "1 Maja"	Steelworks in Gliwice, producing hot-rolled products	
	Zaklad Wielkopiecowy "Szczecin" Sp. z o.o.	Steelworks at Szczecin, producing pig iron	
Sulfur	P.P.Kopalne i Zaklady Przetworcze Siarki "Siarkopol"	Operations at Tarnobrzeg, mining the Jeziorko-Grebow-Wydza deposit.	5,700.
	P.P. Kopalnie i Zaklady Chemiczne Siarki "Siarkopol"	Operations at Grzybow, mining the Osiek and Grzybow-Gacki deposits.	

1/ The data presented in this table was compiled, in large measure, from information provided in the Minerals Yeabook of Poland (Bilans Gospodarki Surowcami Mineralnymi w Polsce Na Tle Gospodarki Swiatowej 1995) prepared and published by the Department of Mineral and Energy Policy, Mineral and Energy Economy Research Centre of the Academy of Science of Poland, Ministry of Environmental Protection, Natural Resources, and Forestry. Additionally, very valuable information and criticism were provided by Mr. Krystof Galos and other members of this academic department.

2/ The production of barite at the "Boguszow " barite mine was stopped in 1997 because of large-scale area flooding and its future status is uncertain.

TABLE 10
SLOVAKIA: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity		1997	1998	1999	2000	2001
METALS						
Aluminum:						
Alumina e/		100,000	100,000	100,000	109,813 r/	110,078 3/
Aluminum ingot, primary		127,182	135,000	127,000 r/	136,753 r/	133,672 3/
Copper:						
Mine output:						
Ore, Cu content		72	155	-- r/	--	-- 3/
Concentrate, gross weight		314	676	-- r/	--	-- 3/
Metal, refined, primary and secondary e/		55 r/	21,626 r/	1,432 r/	1,500 e/	1,500
Gallium metal e/	kilograms	600	600	500	500	500
Gold metal	do.	458	340	363	306	157 3/
Iron and steel:						
Iron ore:						
Gross weight	thousand tons	970	899	891	909 r/	900
Fe content	do.	250	300 r/	300 r/	300	300
Concentrate, Fe content	do.	453	479	465 r/	477 r/	435 3/
Metal:						
Pig iron	do.	3,072	2,756	2,987 r/	3,166 r/	3,255 3/
Ferroalloys, total electric furnace 4/	do.	95	95 e/	95 e/	95	95
Ferrochromium		11,394	11,785	6,986	17,702 r/	15,000
Ferrosilicon e/		50,133	49,963	70,000	50,000	50,000
Steel, crude	thousand tons	3,484	3,178	3,569 r/	3,733 r/	3,989 3/
Semimanufactures e/	do.	3,600	3,500	3,500	3,500	
INDUSTRIAL MINERALS						
Barite concentrate		62,102	14,880	15,900	13,700	15,000
Cement, hydraulic	thousand tons	3,136	2,875	4,718 r/	3,045 r/	3,123 3/
Clays:						
Bentonite		79,760	81,010	64,390	66,528 r/	82,915 3/
Kaolin		22,720	14,580	22,930	32,000 r/	30,000
Refractory		3,000	12,000	3,000	2,000 r/	3,000
Diamond, synthetic e/	carats	5,000	5,000	5,000	5,000	5,000
Dolomite	thousand tons	1,989	1,796	1,505	1,176 r/	1,471 3/
Gypsum and anhydrite, crude		116,000	128,000	117,000	124,000 r/	169,000 3/
Lime, hydrated and quicklime	thousand tons	685	744 r/	759 r/	754 r/	816 3/
Magnesite, concentrate		863,600	877,840	918	1,000	447 3/
Nitrogen, N content of ammonia e/		250,000	250,000	250,000	215,000 r/	209,000 3/
Perlite		25,020	24,240	19,460	17,020	15,000 3/
Salt		126,800	100,470	119,000	121,700	123,000 3/
Sand and gravel	thousand cubic meters	1,872	1,906	1,469	1,271 r/	1,300
Stone:						
Limestone and other calcareous stones for cement	thousand tons	7,800	7,200	7,000	6,700 r/	6,500
Crushed stone	thousand cubic meters	3,510	4,318	2,844	2,868 r/	3,000
Talc		6,100	2,820	1,900	1,800	2,600 3/
Zeolite		14,000	10,000	14,000	15,000 r/	15,000
MINERAL FUELS AND RELATED MATERIALS						
Coal, brown and lignite	thousand tons	3,942	3,966	3,745	3,589 r/	3,424 3/
Coke						
Metallurgical	do.	1,708	1,730	1,515	1,500	1,500
Unspecified e/	do.	200	200	200	200	200
Natural gas	million cubic meters	309	311	235	202 r/	212 3/
Petroleum:						
Crude:						
As reported	thousand tons	63	61	59	60	54 3/
Converted	thousand 42-gallon barrels	426	400 e/	400 e/	400	400
Refinery products e/	do.	40,000	40,000	40,000	40,000	40,000

e/ Estimated. r/ Revised. -- Zero.

1/ Table includes data available through March 2003. In addition to the commodities listed, arsenic, diatomite, feldspar, illite, sodium compounds, sulfur, sulfuric acid, and talc are produced, but information is inadequate to make reliable estimates of output.

2/ Estimated data are rounded to no more than three significant digits.

3/ Reported figure.

4/ May include some FeCrSi and FeNi, if any was produced.

TABLE 11
SLOVAKIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand of metric tons unless otherwise specified)

Commodity	Major operating companies 1/	Location of main facilities 2/	Annual capacity
Aluminum	ZSNP Aluminum Works (Slovalco)	Ziar and Hronom, central Slovakia	60
Antimony:			
Ore	Liptovska Dubrava	Central Slovakia	50
Do.	Pezinok	Western Slovakia	50
Smelter	Vajskova	Central Slovakia	2
Cement	Lietavska Lucka, Stupava, and Turna	Slovakia	5400
Coal:			
Brown	Hornonitranske Bane, a.s.	Prievidza, central Slovakia	3,500
Do.	Bana Dolina, a.s.	V'lky Krtis, southern Slovakia	500
Lignite	Bana Zhorie, a.s.,	Holic, Western Slovakia	400
Copper:			
Ore	Slovinky, Hodrusa-Hamre, and Rudnany	Central Slovakia	500
Refinery	Krompachy	do.	27
Gallium kilograms	ZSNP Aluminum Works	Ziar and Hronom, central Slovakia	4000
Iron:			
Ore	Nizana Slana and Rudnany	Central Slovakia	1600
Concentrate	do.	do.	1300
Lead-zinc, ore	Banska Stiavnica	do.	200
Magnesite	SMZ a.s. Jelsava	Eastern Slovakia	350
Do.	Slovmag a.s., Lubenik	Central Slovakia	150
Petroleum, refinery	Bratislava, Dubova	Slovakia	NA
Salt	Solivary a.s., Presov	Eastern Slovakia	150
Steel, crude	VSZ HOLDING, a.s., formerly Vychodoslvenske Zeleziarne sp (East Slovak Iron and Steel Works)	Eastern Slovakia, Kosice	4000
Do.	Zeleziarne Podbrezova a.s.	Slovakia, Podbrezova	600

NA Not available.

1/ All mining companies are Government-owned.

2/ Names and locations of mines and crude oil refineries are identical.

THE MINERAL INDUSTRIES OF

DENMARK, THE FAROE ISLANDS, AND GREENLAND

By Chin S. Kuo

DENMARK

Denmark is an industrialized market economy with a gross domestic product (GDP) of $161 million in 2001. Slow economic growth was noted with only 0.9% increase in the GDP. Its standard of living was among the highest in the world with a per capita income of $31,151. The country depended on imported raw materials and foreign trade. Denmark's mineral resources are mainly fossil fuels that are located in natural gas and petroleum fields in the North Sea. The nonfuel minerals industry included mining and quarrying of chalk, clays, diatomite, limestone, and sand and gravel and production of secondary aluminum and crude steel and its semimanufactures.

Denmark's relatively high drilling activity was due to commitment wells on fifth-round acreage. Oil discoveries were made by Dansk Operatorselskab IS at Nini 1A and Cecilie 1A. Oil production in 2001 totaled 14.1 million metric tons (Mt), or 88,100 barrels, which was up by 0.3% compared with that of 2000. Denmark was the third largest oil producer in western Europe after Norway and the United Kingdom (Alexander's Gas & Oil Connections, 2002§[1]).

A group led by UAB Minijos Nafta was awarded a 364,000-hectare 6-year license 1/01 in southern Jutland in the Zechstein basin. Initial work involved evaluation of existing data, seismic reprocessing, a pilot geochemical survey, and prospect-lead definition. The group also included Sterling Resources Ltd. of Canada, DONG of Denmark, and Dansk Venture Olieefterforskning Aps (Oil & Gas Journal, 2001a).

Oil was found in sandstones of late Jurassic age in Phillips Petroleum International Corp. Denmark's Hejre-1 exploration well on license 5/98 in the northern Danish central graben. The ENSCO rig would be moved to a position in the eastern part of the central graben to drill exploration well Svane-1 on license 4/98 (Oil & Gas Journal, 2001b).

The Denerco Group made two new oil discoveries in the Danish part of the North Sea under license 16/98. The group initially found oil with its Cecilie-1 well at a location about 13 kilometers (km) southwest of the Siri Field. Test production from the well yielded oil at a rate of up to 1,888 barrels per day (bbl/d). The group also completed the Connie-1 exploration well under the same license and found oil in sandstones of Palaeocene age (Danish Environment & Energy Newsletter, 2001§).

Amerada Hess Corp. of the United States sold its 26% stake in Denerco Oil (a subsidiary of Deneco Group). The divestment left Denerco Oil with 11 owners led by Danish LD Energi/LD Energi Offshore with a 34% stake and DPE (a Danish consortium) with 25%. Other leading shareholders included Danske Bank and the engineering group FLS Industries. Denerco Oil and Amerada Hess would continue cooperation in Denamark's South Arne North Sea offshore field (Yahoo Finance, 2001§).

Dansk Undergrunds Consortium submitted a $520 million plan for further development of the Halfdan Field off Denmark. The phase 3 development plan included drilling 11 wells and 11 related water injection wells. The central platform would be extended with a facility for processing and compression of gas and a facility for processing of produced water. Overall production from the field was to increase to 100,000 bbl/d in 2005. The consortium included A.P. Moller Co., Maersk Olie og Gas, Royal Dutch/Shell Group, and Chevron Texaco Corp. (Oil & Gas Journal, 2001d).

A gas explosion on North Sea offshore Gorm Field in May led to a production halt on Gorm and its four satellite fields, Dagmar, Halfdan, Rolf, and Skjold. Production on Halfdan resumed in July with the rest of the fields not fully operative until September (Alexander's Gas & Oil Connections, 2001b§)

Statoil AS of Norway stopped flaring gas at its marginal North Siri Field in a Danish offshore installation. The field is in 60 meters (m) of water on block 5604/20 on the Ringkobinng-Fyn high. It would be either used in power generation or re-injected by produced water. Injecting produced water increased wear on the injection pumps, and their design was to be modified. The installation produced 30,000 bbl/d of oil beginning in March 1999 and was to cease production between 2005 and 2007 (Oil & Gas Journal, 2001e).

FAROE ISLANDS

The Faroe Islands have been a self-governing community within the Kingdom of Denmark. Their territorial waters could be the next oil frontier for the North Sea oil industry. Cod fishing is the island's only industry, which earned more than 90% of total income. Offshore oil drilling, however, began in 2001. Statoil and its partner Enterprise Oil started the first exploration well on the Longan prospect off the Faroe Islands in June. The well held traces of hydrocarbons, but no commercial oil. British Petroleum and Faroese Partnership, which comprised BG, DONG, and Atlantic Petroleum Corp., with Amerada Hess as the operator, were scheduled to drill one well in late summer. The well was very close to the United Kingdom-Faroes boundary (Alexander's Gas & Oil Connections, 2001a§). The well on license 001 in the Faroese offshore discovered light oil and gas and was drilled to a total depth of 4,275 m.

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[1] References that include a section twist (§) are found in the Internet References Cited section.

The home-rule Government has full authority over hydrocarbon activity in its territory. The first bidding round was opened in February 2000. By August, the Government had awarded seven licenses that cover 38 blocks and part blocks (Oil & Gas Journal, 2001c).

GREENLAND

Greenland's mineral and petroleum resources have not been developed, although increased exploration activities for diamond and gold were noted in 2001. Other mineral commodities explored for included base metals, industrial minerals, iron, nickel, and platinum-group metals. Exploration drillings in offshore areas were active, but yielded no oil or gas.

Crew Development Corp. of Canada acquired a 50% interest in the Nalunaq project, which was a high-grade gold deposit 40 km from Nanortalik near the southern tip of Greenland, by merging with Mindex ASA of Norway. Crew had a two-thirds interest in the joint-venture Nalunaq I/S, and the Government-owned NunaMinerals A/S held the remainder. Crew had conducted extensive underground development and bulk sampling to provide the data for a final feasibility study and subsequent financing. The target of the test program was a resource that could support ore production of 500 metric tons per day, which could result in an output of 4,600 kilograms per year of gold. An indicated and inferred resource of 440,000 metric tons (t) was determined with an average grade of 32 grams per metric ton gold (Miners News, 2001). A test-mining program had developed four stopes at Nalunaq and was used to assess the mining method.

Cabot Corp. of the United States planned to raise its stake in Angus & Ross Plc, which had the mining rights to an area that covers 414 square kilometers around Narsarsuq in southern Greenland and would start drilling tests for tantalum. The columbium (niobium)-tantalum mineralization was in the form of pyrochlore and found outside the existing deposit in the Anjing Hitam zone. Several mineralized zones, which include a 50-Mt resource with grades of 0.03% to 0.1% tantalum oxide and a 130-Mt resource with columbium (niobium) oxide grades of 0.4% to 1.0%, were identified (Mining Journal, 2001b). Cabot had options to acquire 1 million shares (4.99%) and to subscribe to 4 million new shares and a further 5 million new shares in the future. In return, it would agree to buy 50% of any eventual production. Cabot was one of the world's largest producers of refined tantalum oxide. Since 1999, world tantalum demand has been growing at a rate of 10% per year and was 1,810 t in 2001. Angus & Ross would use some of the proceeds raised to carry out the test drilling (Financial Times, 2001§). Preliminary field work included mapping and sampling and further definition of mineralized zones and would be followed by test and delineation drilling and additional geologic evaluation and metallurgical test work.

Diamond exploration in Greenland was concentrated on an Archaean cratonic shield area along the southwestern coast. Targets were 8-km-long diamondiferous kimberlite dikes that contained several small pipes. No economic prospects have been outlined. The exploration companies included Citation Resources Inc. of Canada in joint ventures with De Beers and Dia Met Minerals Ltd. (Mining Journal, 2001a). Citation Resources also reported that sulfide mineralization that carries anomalous polymetallic values was intersected during drilling on joint-venture ground in west Greenland.

The drilling of one wildcat, Statoil's Qulleq 1, was dry but found reservoir-quality Cretaceous sandstones. Meanwhile, the Government invited nominations for areas of interest ahead of a planned round of licensing in 2001 off the southwestern coast.

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Major Source of Information

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TABLE 1
DENMARK: ESTIMATED PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity		1997	1998	1999	2000	2001
Aluminum metal, secondary		14,000	14,000	14,000	16,000	16,000
Cement, hydraulic		2,683,039 3/	2,077,000 r/ 3/	1,926,000 r/ 3/	2,009,000 r/ 3/	2,010,000
Chalk		427,634 3/	425,000	400,000	400,000	410,000
Clays:						
Fire clay		20 3/	20	20	25	25
Kaolin		3,000	2,500	2,500	2,500	2,000
Other		8,000	6,000	6,000	6,500	6,500
Moler, extracted	thousand cubic meters	185	185	185 r/	185	185
Gas:						
Manufactured	terajoules	1,500	1,500	1,500	1,500	1,500
Natural:						
Gross	million cubic meters	9,530	9,600	9,600	9,700	9,700
Marketable	do.	6,960 3/	7,000	7,000	7,100	7,100
Iron and steel metal, steel:						
Crude	thousand metric tons	787 3/	790 3/	748 3/	750 3/	760
Semimanufactures	do.	625	706 3/	600	700	700
Lime, hydrated and quicklime		115,129 3/	116,000	115,000	115,000	114,000
Natural gas plant liquids	thousand 42-gallon barrels	45,000	45,000	45,000	46,000	46,000
Nitrogen, N content of ammonia		1,600	1,600	1,600	1,600	1,600
Peat		205,000	205,000	200,000	200,000	200,000
Petroleum:						
Crude	thousand 42-gallon barrels	83,950 3/	84,000	84,000	87,860 r/ 3/	88,130 3/
Refinery products:						
Liquefied petroleum gas	do.	1,600	1,600	1,600	1,700	1,700
Gasoline	do.	30,200	30,000	30,000	30,000	30,000
Naphtha	do.	1,200	1,200	1,200	1,300	13,000
Jet fuel	do.	1,800	1,800	1,800	2,000	2,000
Kerosene	do.	100	100	100	100	100
Distillate fuel oil	do.	28,000	28,000	28,000	28,200	28,500
Refinery gas	do.	1,600	1,600	1,600	1,700	17,000
Lubricants	do.	300	300	300	300	300
Residual fuel oil	do.	13,500	13,500	13,000	13,000	13,000
Petroleum coke	do.	60	60	60	60	60
Total	do.	78,400	78,200	77,700	78,400	78,700
Phosphates, crude, gross weight		1,200	1,200	1,200	1,300	1,300
Salt, all forms		600,000	600,000	600,000	605,000	605,000
Sand and gravel:						
Onshore	thousand cubic meters	18,000	18,000	18,000	18,000	18,000
Offshore	do.	5,000	5,000	5,000	5,000	5,000
Total	do.	23,000	23,000	23,000	23,000	23,000
Of which, sand, industrial (sales)	do.	50	50	50	50	60
Stone:						
Dimension (mostly granite)		26,000	26,000	26,000	27,000	27,000
Limestone:						
Agricultural		700,000	700,000	700,000	700,000	700,000
Industrial		250,000	250,000	250,000	250,000	250,000
Sulfur, byproduct		10,585 3/	10,000	10,000	10,500	11,000

r/ Revised.

1/ Table includes data available through June 5, 2002. Estimated data based on sales of domestically produced mineral commodities.

2/ Estimated data are rounded to no more than three significant digits; may not add to totals shown.

3/ Reported figure.

THE MINERAL INDUSTRIES OF

ESTONIA, LATVIA, AND LITHUANIA

By Chin S. Kuo

ESTONIA

The Estonian economy continued to grow with an increase of 5.4% in the gross domestic product (GDP) in 2001. Inflation declined modestly to 4.8%, but the unemployment rate remained high at 12.6%. The country's mineral industry consisted mainly of production of oil shale, peat, and industrial minerals, such as clays, limestone, and sand and gravel. Estonia, which is nearly energy independent, supplied more than 90% of its electricity needs with locally mined oil shale but still imported petroleum products from Western Europe and Russia for its requirements. Estonia was a major trade center and transshipment point of mineral products between Russia and Europe. Its ice-free port of Muuga, near Tallinn, is a modern facility that features good transshipment capability with brand-new oil tanker off-loading areas. The country's liberal foreign trade policy contains few tariffs or nontariff barriers (U.S. Department of State, 2002§[1]).

As part of its negotiation for entry into the European Union (EU), Estonia requested special treatment to permit the continued use of its oil shale. The country asked for funds for research on technology to reduce the environmental effects of using oil shale. This would benefit the northeastern Ida-Virumaa oil-shale-mining region. Estonia needed the EU's support to develop more efficient and environment-friendly technologies for its oil-shale-based energy sector. The country also sought the support from the EU to finance solutions to social problems related to opening its market for electricity. Estonia wanted the larger part of electricity generated in the country to continue to come from oil-shale-fueled powerplants in the future (Estonian Review, 2001§).

In the first half of 2001, Estonia imported 500 metric tons (t) of nickel scrap from the United States. Estonia's purchases of scrap picked up after Norilsk Nickel of Russia, which was the world's largest nickel producer, reduced nickel exports (Metal Bulletin, 2001). This activity appeared to reflect speculative purchases given Estonia's lack of metallurgical facilities for processing the scrap.

Estonia's limestone quarry in Tallinn switched from conventional blasting to mining with hydraulic hammers directly from the quarry face in 1995. A hammer could break from 240 to 300 t of limestone in an 8-hour shift. In 2000, the quarry produced 300,000 t of limestone, of which two-thirds were mined by hydraulic hammers (World Cement, 2001).

LATVIA

Latvia's real GDP grew by 7.6% in 2001 with strong gains in forestry, business services, financial intermediation, and manufacturing. Less capital-intensive and foreign direct investment contributed to an increase in production capacity and competitiveness of its manufacturing base. Latvia had a small mineral industry that produced such industrial minerals as gypsum, limestone, and sand and gravel. It also was engaged in peat mining and cement and steel production. Although the country has not produced oil and gas commercially, offshore, the Baltic Sea was being explored. Latvia had onshore oil and gas pipeline networks and transshipped large volumes of Russian crude oil and petroleum product exports through the port of Ventspils. It also transshipped such mineral products as potash and other fertilizers. The Government planned to issue the first onshore licenses beginning in 2003. In the past, Latvia had several small onshore discoveries, which included Kuldiga, 75 kilometers northeast of Liepaja (Oil & Gas Journal, 2001a).

Latvia and the EU concluded the energy chapter of their negotiations on Latvia's entry to the EU in December 2001. It was agreed that Latvia could not immediately open its gas market to non-Russian suppliers owing to a lack of alternative pipelines. The Latvian Parliament agreed on the need to liberalize the country's energy market. Latvia was one of 12 nations that were negotiating their entry into the EU by 2004 (Alexander's Gas & Oil Connections, 2002).

The first Latvian bidding round, which comprised 73 offshore blocks in the Baltic Sea, was officially announced in November 2000 and opened in April 2001. Each block covered 382 square kilometers. The Government offered 7 permits for exploration and drilling with the deadline for application on January 25, 2002 and 66 blocks for preinvestigation licenses by October 31, 2001. The exploration and drilling permits would be granted for 30 years inclusive of a 5-year maximum exploration phase, and the preinvestigation licenses would be for 2 years with a 5- year extension option. The Government would retain a 10% stake in all awarded licenses; the licensees would be subject to a 25% corporate tax and an oil royalty of 2% to 12%. Of the more than 50 wells that have been drilled in the entire Baltic Sea, 35 had shows of mostly oil (Oil & Gas Journal, 2001b).

The Government planned for the sale of its remaining 3% share in Latvijas Gaze for privatization. The company was a monopoly importer with business in storage and distribution of gas in Latvia. Ruhrgas and E.ON. Energie of Germany proposed to buy the state ownership at a price higher than that on the Riga Stock Market. The Government also supported the gradual liberalization of the domestic gas market. Domestic gas suppliers would set fees. The measure was to avoid large distortions on the market and the possibility of a single supplier occupying a dominant position on the market (Interfax Petroleum Report, 2001).

Itera Latvija (a subsidiary of Itera Group of Russia) was one of the major importers and suppliers of natural gas to Latvia from Russia. In 2001, the company planned to deliver 400 million cubic meters of natural gas, which represented 25% of Latvia's total imports. It intended to participate in the gasification of Latvian cities and villages and in the building of new industrial plants and electric powerplants. Itera Latvija was a major shareholder of the Latvian gas company Latvijas Gaze (25%) and a shareholder of the Estonian gas company Eesti Gaas (10%) (PR Newswire, 2001§). The company successfully executed a long-term contract with Latvijia Gaze on gas fuel supply up to 2005.

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[1] References that include a section twist (§) are found in the Internet References Cited section.

LITHUANIA

Lithuania has been slowly recovering from the 1998 Russian financial crisis, but high unemployment at 12.5% in 2001 and weak consumption have held back its recovery. The real GDP growth rate was estimated to be 4.8%. With a low inflation rate of 1.3% the country reached a GDP per capita of $7,600. Industrial production including petroleum refining and fertilizer manufacturing grew at 15%. Mineral output was limited to peat extraction and limestone mining for cement production. Privatization of the large state-owned utilities, particularly in the energy sector, was underway. Lithuania conducted the most trade with Russia and increased trade volume with Europe. Mineral products in transshipment accounted for 21% of its exports and 23% of its imports in 2000 (the latest year for which data are available) (U.S. Central Intelligence Agency, 2002§).

Lithuania's state-owned oil company Mazeikiu Nafta comprised the Mazeikiai refinery, the Butinge oil terminal, and the Birzai pipeline system. The Government was considering selling a one-third stake in Mazeikiu Nafta to LUKOIL of Russia. The Government owned 59% of Mazeikiu Nafta with Williams International Co. of the United States holding 33% and operational control. Williams International took its holding in 1999 for $150 million with an option to double its stake. The sale to LUKOIL was to secure long-term stable oil supplies for the refinery (Reuters, 2001a§).

In a new development, YUKOS of Russia beat LUKOIL to land an equity and supply deal with Mazeikiu Nafta's refinery pending Government approval. YUKOS would invest $75 million in the refinery for a 26.85% stake, thereby diluting Williams International's 33% share to 26.85%. The Government's 59% stake was down to a slight minority. YUKOS also would provide a $75 million credit line to finance the modernization of the refinery and raise throughput to design capacity of 300,000 barrels per day (bbl/d). The refinery's current capacity was 140,000 bbl/d. YUKOS pledged to supply 35 million barrels per year of crude oil, which was one-third of the refinery needs, for 10 years. LUKOIL would remain an important supplier for Mazeikiu Nafta's refinery (Reuters, 2001b§).

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TABLE 1
ESTONIA, LATVIA, AND LITHUANIA: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Country and commodity	1997	1998	1999	2000	2001
ESTONIA					
Cement	422,500	321,000	357,700	329,100	404,600
Clays:					
For brick thousand cubic meters	66,500	96,600	107,100	97,200	119,800
For cement do.	25,500	33,000	38,400	37,700	25,700
Limestone e/	280,000	290,000	290,000	300,000	300,000
Nitrogen, N content of ammonia	153,000	175,000	145,500	127,500	135,000
Oil shale thousand tons	14,383	12,463	10,685	11,727 r/	11,837
Peat do.	1,002	365	1,299	760 r/	844
Sand and gravel thousand cubic meters	1,109	1,411	1,063	1,247	1,325
Silica sand, industrial do.	22,500	23,000	18,300	39,600	31,600
LATVIA					
Cement	246,377	365,629	W	W	W
Gypsum	116,916	119,096	W	W	W
Limestone	372,660	363,347	W	W	W
Peat	554,700	171,700	956,353	456,456 r/	555,003
Sand and gravel	90,551	480,609	787,317	790,257 r/	688,904
Steel:					
Crude	464,529	468,500	483,744	500,292	W
Products	NA	516,400	520,000	525,000 e/	W
LITHUANIA 2/					
Cement	714,000	788,300	666,000	569,500	529,100
Limestone	250,000 e/	250,000 e/	1,077,900	783,300	857,500
Nitrogen, N content of ammonia	467,300	407,300	401,300	509,900 r/	540,100
Peat	295,200	202,000	390,100	245,500	262,700
Petroleum:					
Crude	160,000	200,000	250,000 e/	317,900 r/	471,400
Refinery products	5,029,400	6,433,900	4,506,700	4,658,200	6,543,500

e/ Estimated; estimated data are rounded to no more than three significant digits. r/ Revised. NA Not available. W Withheld by the Latvian Government to avoid disclosing proprietary data.

1/ Table includes available data through September 2002.

2/ Lithuania produces other industrial minerals including clays and sand and gravel; consistent data are unavailable for deriving a multiyear production series.

THE MINERAL INDUSTRY OF

FINLAND

By Chin S. Kuo

Finland's gross domestic product (GDP) growth rate amounted to only 0.7% in 2001 compared with 5.6% in 2000. The growth was stalled by a reduction in worldwide demand for products; exports amounted to $46 billion. Exports of goods contributed 42% to the country's GDP, and industrial production contributed 28.3%. Per capita income was $23,207. The 2001 unemployment rate of 9.1% was above the European Union average (U.S. Department of State, 2002§[1]).

Finland is an industrialized market economy country. The metals industry was one of the key sectors of the economy. Copper refining and metals production constituted a major mineral industry, and its output was largely exported. The country depended on imports of raw materials and energy except for several indigenous minerals. Crude oil, iron ore, nickel matte, petroleum products, and zinc concentrate were the main imports. Exploration activities were focused on base metals, diamond, and gold deposits.

Belvedere Resouces Ltd. of Canada completed the first phase of exploration on its Susineva claims at Kaskela in central Finland to delineate further surface massive sulfide zinc and copper mineralization. The program consisted of 9 shallow drill holes, which totaled 626 meters (m), and 137 pits dug to sample bedrock. Surface pitting produced some good sulfide mineralization with anomalous zinc and copper values. Two closely spaced lenses that contain massive chalcopyrite, pyrite, and sphalerite had been identified along a 400-m strike length. Phase II of the exploration program to drill strong gravity anomalies was scheduled for late October 2001 (Canada NewsWire, 2001).

Riddarhyttan Resources AB of Sweden received better assay results than before from a continuing drilling program at the Suurikuusikko gold property in northern Finland. In 1998, Riddarhyttan won an international tender for the property, which is located in the middle of the Lapland greenstone belt. Riddarhyttan estimated that the deposit contained indicated and inferred resources of 6 million metric tons (Mt) at an average grade of 6 grams per metric ton (g/t) gold. A deposit model suggested that two zones of mineralization at the property were connected (Mining Journal, 2001d).

Outokumpu Oyj planned to expand its Harjavalta operation to a production capacity of 250,000 metric tons per year (t/yr) of copper by 2005. The smelter produced 170,000 t/yr of blister copper and smelted nickel on a toll basis for OM Group, Inc., of the United States. The furnaces would be converted to accommodate copper production. Copper concentrates would come from Sociedade Mineira de Neves-Corvo S.A. of Portugal and from Argentina and Chile. Capacity at Outokumpu Oyj's refinery in southwestern Finland also would increase to 250,000 t/yr of cathode copper from 125,000 t/yr (Metal Bulletin, 2001c).

AvestaPolarit Oyj Abp was a new stainless steel producer formed by the merger of Outokumpu Steel and Avesta Sheffield in January. Outokumpu would hold 55%; Corus Group of the United Kingdom, 23%; and the public, the remainder. Outokumpu was bound by the merger agreement to reduce its holding to 40% within 3 years of share flotation. In terms of a slab capacity of 1.75 million metric tons per year (Mt/yr) and a billet/bloom capacity of 230,000 t/yr, AvestaPolarit was the world's second largest stainless steel company after Nippon Steel Corp. Stainless coil would be produced at Tornio, Finland; Avesta, Langshyttan, and Nyby, Sweden; and Sheffield, United Kingdom (Metal Bulletin, 2001a).

Outokumpu Technology finalized its acquisition of the metallurgical businesses of Lurgi Metallurgie AG of Germany for $46 million. The acquisition would significantly strengthen its technology business. As a result, Outokumpu Technology became the world's leading supplier of copper and zinc plants, a major supplier of aluminum technologies, and the key supplier of innovative technologies for the ferrous metals and ferroalloy industries. The company acquired Inprosys Inc., KHD Aluminium Technology GmbH, the grinding mill operations of Metso Corporation, and Royal Pannevis BV (Mining Journal, 2001c).

Imatra Steel planned to invest $18.5 million to modernize its continuous bloom caster and heavy rolling mill to improve quality and to raise capacity by 10% to 300,000 t/yr. The changes at the works would be completed in 2003. The Imatra works, which produced round, square, and flat bars, also had an electric-arc furnace, ladle metallurgy, heat treatment facilities, and a billet rolling line. The other production unit in Finland was the Billnas Spring works that made leaf springs and tubular stabilizer bars (Metal Bulletin, 2001d).

Rautaruukki Oy planned shutdowns so that the two blast furnaces at its Raahe works could be repaired in fall 2002 and fall 2003. The company will have to buy slab on the open market. Fundia AB (a subsidiary of Rautaruukki) announced 80 job cuts at its plants in Dalsbruk and Koverhar in 2001 to 2002. In 2001, an endless rolling system was installed at Dalsbruk. The Koverhar works would reduce its exports of billets. Fundia started up a new ladle furnace and modernized caster at Koverhar (Metal Bulletin, 2001b).

Outokumpu started talks with the 150 employees at its Hitura nickel mine in Nivala about the possible closure of the operation. The company was obliged by law to consult with workers before shutting the mine. The decision on whether to close the operation would be made in fall 2001. The mine, which has been in operation for 30 years, supplied nickel concentrates mainly to the company's Harjavalta nickel smelter (Metal Bulletin, 2001f).

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[1] References that include a section twist (§) are found in the Internet References Cited section.

South Atlantic Resources Ltd. of Canada acquired a 100% interest in the Nordic Platinum project in northern Finland from North Atlantic Natural Resources AB. The project encompassed more than 300 square kilometers and is adjacent to the Arctic Platinum Partnership's (Gold Fields Ltd./ Outokumpu) platinum-group metal (PGM) discoveries. An airborne electromagnetic survey showed at least 15 significant anomalies. The company was organizing an exploration program that would include reconnaissance geochemical sampling and prospecting, ground geophysics, and preliminary scout drilling (CCN Newswire, 2001§). Ground geophysical program was underway with horizontal-loop electromagnetic survey.

The Arctic Platinum Partnership received an updated resource estimate for the PGM deposits at Ahmavaara and Konttijarvi. The Ahmavaara model was based on data from 322 diamond-drill holes (for 28,000 m) and that at Konttijarvi was based on data from 163 diamond-drill holes (for 19,200 m). At a cutoff grade of 0.5 g/t platinum, palladium, and gold, the total resources were estimated to be 803,000 kilograms (kg), of which 75,000 kg was proven and 728,000 kg was probable (Mining Journal, 2001a).

Kemira Pigments (part of the Kemira Group) invested $18.5 million to implement a 10,000-t/yr-capacity increase at its titanium dioxide plant at Pori. Capacity would be increased from 120,000 t/yr to 130,000 t/yr by 2003 and to 150,000 t/yr with long-term planning. Kemira was the world's seventh largest producer with a 3% share of total global capacity of 4.514 Mt/yr in 2001. The principal raw material at the Pori plant was ilmenite; titanium dioxide pigment, which is used in paint, paper, and plastic, was produced (Industrial Minerals, 2001).

Outokumpu sold its Pyhasalmi zinc-copper mine in central Finland to Inmet Mining Corp. of Canada. The mine produced 14,000 t/yr of copper-in-concentrate and 30,000 t/yr of zinc-in-concentrate. Concentrates would be supplied to Outokumpu for smelting. The agreement also called for cooperation with respect to smelting and refining material from other Inmet mines. The mine had proven and probable reserves that total 17.2 Mt at a grade of 1.2% copper, 2.8% zinc, 0.4 g/t gold, and 39% sulfur; the mine could produce until 2015 at its 2001 production rate of 1.2 Mt/yr. Pyrite concentrate was sold under long-term contract to the domestic fertilizer industry (Mining Journal, 2001b).

Outokumpu's Kokkola zinc plant expansion came on stream in October and raised the capacity to 260,000 t/yr from 225,000 t/yr at a cost of $27 million. Through the Kokkola expansion and the Norzink of Norway acquisition in 2000, the company was the third largest zinc metal producer in Europe with a 15% share of the market and had a 5% share of world zinc production (Metal Bulletin, 2001e).

WMC of Australia elected to sell its 50% interest in the Mondo Minerals Oy talc joint venture in Finland as a result of the growing concern about the market. Its partner in the joint venture Omya AG offered $62 million for the share, and WMC accepted the offer (Mining Magazine, 2001). Mondo Minerals was the largest producer of paper-grade talc in Europe and operated three talc mines and beneficiation plants.

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Major Source of Information

Geological Survey of Finland
Betonimiehenkuja 4
02150 Espoo
Finland

TABLE 1
FINLAND: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity 3/		1997	1998	1999 e/	2000 e/	2001 e/
METALS						
Aluminum metal, secondary		38,200	40,500	43,989 4/	44,824 r/ 4/	34,488 4/
Cadmium metal, refined		650	520	700	683 4/	604 4/
Chromite: e/						
Gross weight:						
Lump ore	thousand tons	215	220	225	230	215
Concentrate	do.	365	380	400	390 r/	350
Foundry sand	do.	9	10	10	10	10
Total	do.	589 4/	610 4/	635	630 r/	575 4/
Cr_2O_3 content:	do.					
Lump ore	do.	75	75	75	80	75
Concentrate	do.	150	150	150	150	130
Foundry sand	do.	3	5	5	5	5
Total	do.	228 4/	230 4/	230	235	210
Cobalt, metal, powder, and salts		5,000	5,250	6,200 4/	3,864 r/ 4/	3,908 4/
Copper: e/						
Concentrate, gross weight		22,000	25,000	28,000	29,000	29,000
Mine output, Cu content		8,500	9,500	10,500	43,062 r/ 4/	41,146 4/
Metal:						
Smelter		159,000	156,000	149,600 4/	155,400 4/	169,300 4/
Refined		116,000	123,000	114,700 4/	114,035 r/ 4/	119,677 4/
Gold metal	kilograms	3,900	5,000 e/	5,900	4,951 4/	5,552 4/
Iron and steel, metal:						
Pig iron	thousand tons	2,786	2,912	2,954 4/	2,983 4/	2,900
Ferroalloys, ferrochromium	do.	237	231	256 4/	261 4/	237 4/
Steel, crude	do.	3,687	3,932	3,956 4/	4,096 4/	4,100
Semimanufactures, rolled	do.	3,314	3,682	3,700	3,750	3,800
Mercury		63	54	40	76 4/	71 4/
Nickel:						
Mine output, Ni content		3,252	1,967	70 4/	10,714 4/	27,610 4/
Metal, electrolytic		34,228	46,200	51,948 4/	50,087 r/ 4/	51,275 4/
Platinum-group metals: e/						
Palladium	kilograms	180	150	150	-- 4/	-- 4/
Platinum	do.	600 r/	500 r/	500 r/	441 4/	510 4/
Selenium metal	do.	28,000	28,000 e/	26,000	36,293 4/	38,913 4/
Silver metal e/	do.	32,500	29,700	31,500	25,364 4/	23,998 4/
Zinc:						
Mine output, Zn content e/		30,800	30,700	20,000	30,493 4/	36,253 4/
Metal		173,000 r/	199,000 e/	225,200 4/	222,881 4/	247,179 4/
INDUSTRIAL MINERALS						
Cement, hydraulic	thousand tons	905	1,098 r/	1,310 4/	1,422 4/	1,325 4/
Feldspar e/		40,000	40,000	40,000	33,200 4/	34,298 4/
Lime e/	thousand tons	400	400	305 4/	320 4/	333 4/
Nitrogen, N content of ammonia e/		60,000 r/	60,000 r/	60,000 r/	75,344 4/	80,000
Phosphate rock, apatite concentrate:						
Gross weight	thousand tons	690	716	724	750 r/	750
P_2O_5 content	do.	254	260	268	277 r/	277
Pyrite, gross weight e/	do.	950	900	800	706 4/	632 4/
Sodium sulfate e/	do.	30	35	30	31 4/	30 4/
Stone, crushed:						
Limestone and dolomite: e/						
For cement manufacture	do.	1,200	1,200	1,350	1,300	1,400
For agriculture	do.	900	900	1,000	1,000	1,000
For lime manufacture	do.	300	300	350	350	350
Fine powders	do.	300	300	350	350	350
Metallurgical	do.	2	2	1	1	1
Total	do.	2,700	2,700	3,050	3,000	3,100
Quartz silica sand	do.	30 e/	30	73 4/	73 r/	148 4/
Sulfur:						
S content of pyrite	thousand tons	373	430 e/	500	377 4/	337 4/
Byproduct of metallurgy	do.	307	296	300	300	300
Byproduct of petroleum	do.	50	40 e/	45	50	45
Total	do.	730	766 e/	845	850	795

See footnotes at end of table.

TABLE 1--Continued
FINLAND: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity 3/		1997	1998	1999 e/	2000 e/	2001 e/
INDUSTRIAL MINERALS--Continued						
Sulfur--Continued:						
Sulfuric acid e/	thousand tons	1,200	1,200	819 4/	854 4/	298 4/
Talc e/	do.	350	350	469 4/	-- 4/	-- 4/
Wollastonite e/		20,000	22,000	22,000	20,000	20,000
MINERAL FUELS AND RELATED MATERIALS						
Peat:						
For fuel use	thousand tons	9,500	1,700	4,140 4/	3,932 4/	4,000
For agriculture and other uses	do.	600	150	1,595 4/	1,174 4/	1,200
Petroleum refinery products	thousand 42-gallon barrels	76,643	83,370	83,000	80,000	85,000

e/ Estimated. r/ Revised.

1/ Table includes data available through June 19, 2002.

2/ Estimated data are rounded to no more than three significant digits; may not add to totals shown.

3/ In addition to commodities listed, granite and soapstone are produced, but available information is inadequate to make reliable estimates of output levels.

4/ Reported figure.

TABLE 2
FINLAND: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Apatite		Kemira Agro Oy (Government, 98%)	Mine and plant at Siilinjärvi	8,000
Ammonia		Kemira Oyj (Government, 98%)	Plant at Oulu	75
Cadmium, metal		Outokumpu Oyj (Government, 40%; private investors, 12.3%)	Smelter at Kokkola	1
Cement		Finncement Oy (Irish Cement Ltd., 100%)	Plants at Lappeenranta and Parainen	1,020
Chromite		Outokumpu Oyj (Government, 40%; private investors, 12.3%)	Mine at Kemi	1,000
Copper:				
Ore, Cu content		do.	Mines at Pyhäsalmi, Saattopora, and Hitura	10
Metal		do.	Smelter at Harjavalta	160
Do.		do.	Refinery at Pori	125
Feldspar		SP Minerals Oy (Partek Corp., 50.1%; SCR-Silbeco SA, 49.9%)	Mine and plant at Kemiö	50
Ferrochrome		Outokumpu Oyj (Government, 40%; private investors, 12.3%)	Smelter at Tornio	250
Gold:				
Ore, Au content	tons	do.	Mine at Orivesi	4
Metal	do.	do.	Smelter at Pori	4
Ore, Au content	do.	Williams Resources Inc.	Pahtavaara Mine near Sodankyla	3
Limestone		Partek Nordkalk Oy (Partek Corp., 100%)	Mines at Lappeenranta, Pargas and Parainen	1,500
Do.		Rauma-Repola Oy	Mine at Tornio	300
Mercury	tons	Outokumpu Oyj (Government, 40%; private investors, 12.3%)	Smelter at Kokkola	150
Mica		Kemira Oyj (Government, 98%)	Mine at Siilinjarvi	10
Nickel:				
Ore, Ni content		Outokumpu Oyj (Government, 40%; private investors, 12.3%)	Mine at Hitura	3
Metal		do.	Smelter at Harjavalta	32
Do.		OM Group, Inc.	Refinery at Harjavalta	50
Petroleum products		Fortum Oil and Gas Oy	Plants at Naantali and Porvoo	NA
Phosphate-apatite		Kemira Oyj (Government, 98%)	Mine at Siilinjarvi	700
Do.		Outokumpu Oyj (Government, 40%; private investors, 12.3%)	Mine at Pyhäsalmi	800
Quartz and quartzite		SP Minerals Oy (Partek Corp., 50.1%; SCR-Silbeco SA, 49.9%)	Mines at Kemio and Nilsia	250
Selenium	tons	Outokumpu Oyj (Government, 40%; private investors, 12.3%)	Smelter at Pori	35
Silver	do.	do.	do.	30
Steel		Rautaruukki Oy (Government, 41.8%)	Plant at Raahe	2,100
Do.		Fundia AB (Norsk Jenverk AS of Norway, 50%; Rauraruukki, 50%)	Plants at Aminnefors, Dalsbruk, and Koverhar	850
Do.		Ovako Oy (SKF, 50%; Wartsila, 25%; Fiskas, 20%)	Plant at Imatra	600
Stainless		Outopkumpu Oyj (Government, 40%; private investors, 12.3%)	Plant at Tornio	500
Talc		Mondo Minerals Oy (Western Mining Corp. Holdings Ltd., 50%; Plüss-Staufer AG, 50%)	Mines at Lahnaslampi, Lipsavaara, and Horsmanaho	500
Wollastonite		Partek Minerals Oy (Partek Corp., 100%)	Mine at Lappeenranta	30
Zinc:				
Ore, Zn content		Outokumpu Oyj (Government, 40%; private investors, 12.3%)	Mine at Pyhäsalmi	25
Metal		do.	Smelter at Kokkola	260

NA Not available.

THE MINERAL INDUSTRY OF

FRANCE

By Harold R. Newman

France was a major European mineral producer despite traditional mineral industries being in a state of transition during the past few years. The transition was from an economy that featured extensive Government ownership and intervention to one that relies more on market mechanisms. International pressures of globalization and more direct pressure from the European Union (EU) were behind the trend away from Governmental involvement in industry. In accordance with EU requirements, the reduction of Government subsidies to support uneconomic mineral operations continued in 2001. Changing economic conditions, such as rising energy costs, increased imports of raw materials from other countries, lower prices owing to increased competition, and depletion of mineral reserves, have necessitated the closing or reduced output of such traditionally strong mineral extractive operations as bauxite, coal, and iron ore.

Government Policies and Programs

Efforts were continuing to promote the private sector and to reduce the dependence of state-owned companies on subsidies. The Government was proceeding with its program of privatization that required large state-controlled companies to reduce the direct role of the Government in their operations. Efforts included fiscal reform, privatization, and implementation of EU liberalization and deregulation directives. Nevertheless, the Government remained involved in the functioning of the economy through national and local budgets, remaining state holdings of major corporations, and extensive regulation of labor, goods, and services markets. The Government has done little to cut generous unemployment and retirement benefits, which impose a heavy tax burden. Also, the reduction of the workweek to 35 hours has drawn criticism for lowering the competitiveness of French companies (U.S. Embassy, Paris, France, 2001).

The European Commission (EC) told the Government that it should amend its Mining Code or face possible legal action at the European Court of Justice because it does not allow companies from other EU member states to secure French coal mining licences (Mining Magazine, 2001).

Environmental Issues

The Ministry of the Environment is the agency responsible for monitoring the quality of the environment; protecting nature; preventing, reducing, or totally eliminating pollution and other nuisances; and enhancing the quality of life. With this in mind, it conducts two different types of actions. The first are aimed at preserving and protecting spaces and species; this includes prevention of pollution and major risks, nature conservation, protection of landscapes and sites, and management of water resources. The second are aimed at developing research, improving knowledge of the state of the environment, and taking account of concerns at European and international levels (Ministére de L'Écologie et du Développement Durable, 2001§[1]).

France is making progress in solving its most serious ecological problems. The annual review of environmental quality in France set up by the French Environmental Institute (IFEN) highlights a range of issues where improvements are needed, such as air quality in many country towns or the disposal of household wastes. The IFEN identified water pollution by nitrates as the most significant problem in France because of intensive animal farming, especially in the northern part. France was warned by the EC to improve its record on nitrate pollution or face possible legal action at the European Court of Justice (Keil, 2002§).

Production

Mineral and metal industries generally maintained production and other activities at about the same or slightly decreased rates as those of 2000. Several industries, such as bauxite, coal, iron ore, and uranium, have steadily undergone changes during the past few years, especially iron ore, which was no longer mined. Some bauxite waste dumps in the Languedoc region were reprocessed; the resulting product was used by cement companies to correct the alumina and iron content of cement.

The coal industry and other mineral producers were affected by cheaper foreign sources, high operating costs, and the depletion of domestic resources. Coal mining was directed by the state-owned company Charbonnages de France (CdF).

The uranium industry reduced its operations by closing a number of mines and processing plants because of low market prices and depletion of certain deposits. Some factors in the drop of uranium demand were the increased accessibility of petroleum and natural gas from the North Sea and the former Soviet Union (table 1).

Trade

In general, EU agreements and practices determine France's trade policies. France has a tradition of highly centralized administrative oversight of its essentially market-based economy. Strong commercial relations continued between France and the United States, and Germany remained France's largest export destination.

In 2001, France was the ninth largest trading partner of the United States worldwide and the third largest trading partner in

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[1] References that include a section twist (§) are found in the Internet References Cited section.

Europe after the United Kingdom and Germany and had the world's fifth largest industrial market (table 2). France continued with economic expansion although growth has slowed in concert with other EU countries. France accounted for more than 5% of the world gross domestic product (GDP), which made it the country with the fourth largest GDP after the United States, Japan, and Germany. The GDP was expected to grow by 2.3% in 2001. France adopted the euro as of January 1, 1999. Responsibility for the exchange rate was shared between the national finance ministry and the European Central Bank (U.S. Commercial Service, 2001§).

Structure of the Mineral Industry

Government and private companies produced minerals and mineral products, conducted research, and explored for new domestic and international mineral resources. Adjustment to the single European market resulted in mergers, closures of operations, and cooperative ventures as companies sought ways to obtain competitive advantages (table 3).

Commodity Review

Metals

Aluminum.—Pechiney was to increase capacity for superground alumina by constructing a new facility at its Gardanne facility, which was the only production site for alumina in France. The new capacity, which will be 1 million metric tons per year (Mt/yr), would be used for production of alumina for the refractories and ceramic industries. Superground reactive aluminas are suitable for ceramic and refractory applications. Their fine and ultrafine grain-size distribution is particularly important for refractories, and their high sintering capacity is valuable in the production of ceramics (Industrial Minerals, 2001b).

After a brief lull in 2001, the aluminum industry was expected to resume the process of consolidation. Norsk Hydro A/S was proceeding with the acquisition of VAW Aluminium A.G. If this happens, then Norsk Hydro would eclipse Pechiney as Europe's biggest aluminum company. Pechiney stated that it would be interested in acquiring the flexible packaging businesses of VAW after Norsk announced that it was selling it (Metal Bulletin, 2002).

Gold.—Gold mining in France was mostly concentrated in Société des Mines du Bourneix's open pit and underground operations south of Limoges in the Saint Yrieix la Perche district and Mines d'Or de Salsigne's underground Salsigne Mine near Carcassonne. The Salsigne Mine was in receivership and was operating under the protection of the French courts.

Lead and Zinc.—Mining of lead and zinc has completely ceased in France. In 2001, two companies operated lead and zinc plants using imported ores and concentrates. Métaleurop S.A. operated a 125,000-metric-ton-per-year (t/yr) primary lead smelter and a 40,000-t/yr secondary lead smelter (Société de l'Industrie Minérale, 2001a). Union Minière S.A. operated a zinc refinery with a capacity of 220,000 t/yr of zinc, and Métaleurop S.A. operated a 110,000-t/yr zinc refinery (Société de l'Industrie Minérale, 2001c).

Métaleurop announced that it would spend about $22 million to revamp its Noyelles Godault lead-zinc plant. The money would be spent on reengineering to increase the operating ratio of the plant and better utilize its capacity. Métaleurop would not specify how much the increase in production would be but said that the improvements would significantly reduce downtime at the plant (Metal Bulletin, 2001b).

Magnesium.—The permanent closure of the EU's only magnesium producer Pechiney Electrométallurgie's Marignac plant left the European magnesium market in limbo. The plant's magnesium production had fallen victim to increased competition from cheaper Chinese imports and the overall drop in magnesium prices. The EU had imposed antidumping duties against imports of magnesium from China. With no European business to protect, the market was left to speculate as to if, or when, those duties will be removed (Metal Bulletin, 2001a).

Steel.—Aceralia S.A. of Spain, Acieries Reunies de Burbach-Eich-Dudelang (ARBED) of Luxembourg, and Usinor Group of France have agreed to merge their businesses and specialities. When the new company is created, the partners will make up the world's largest steel group. It will have the capacity to produce 46 Mt/yr of liquid steel at a sales volume of about $30 billion. Aceralia, ARBED, and Usinor would form the multispeciality group Arcelor S.A., and the merger would furnish the companies the means to be stronger in Europe and to develop more rapidly outside of Europe. The new group that will emerg from the integration will focus its activities on flat carbon steel products, long carbon steel products, stainless steel products, and distribution, processing, and trading. The EC gave permission for the integration in November 2001 (Arcelor S.A., 2001§).

Usinor and Nipon Steel Corp. of Japan (NSC) have signed a cooperation agreement that could lead to the establishment of joint-venture steel production plants. Initially, the focus for collaboration would be sheet steel for the automotive industry, but NSC and Usinor said that it also could extend to tinplate and stainless steel. Both companies stressed that the agreement did not cover their sales activities and that they would remain competitors at the commercial level and did not expect to exchange shareholdings or directors (Metal Bulletin, 2001c).

Uranium.—Compagnie Générale des Matières Nucléaires (COGEMA), which was the state-owned uranium mining company, was the major producer of uranium. France was the world's largest per capita nuclear power generator and ranked second in total installed nuclear capacity after the United States. About 75% of electricity generated in France came from 57 nuclear plants. This has changed dramatically since 1973 when fossil fuels accounted for more than 80% of power generation. France faces choices of replacing obsolete nuclear plants with more modern plants or beginning to phase out nuclear power generation (U.S. Energy Information Administration, 2002§).

The U.S. International Trade Commission (ITC) gave final approval to import duties that total more than 32% on shipments of more than $200 million worth of nuclear powerplant fuel. France is one of the biggest suppliers of enriched uranium to the U.S. market. At the World Trade Organization, the EU was expected to challenge the decision on any antidumping and countervailing duties imposed (Yahoo Inc., 2002§).

Industrial Minerals

Cement.—Lafarge SA and Société des Ciments Français were the two largest producers of cement in France. Each company had control of approximately one-third of the domestic market. Lafarge was the world's largest producer of cement with 113 cement plants and 30 grinding plants in 46 countries (Lafarge SA, 2001b§).

Lafarge announced that the acquisition of Blue Circle Industries (BCI) of the United Kingdom had been finalized. The process of integration was expected to be completed by yearend 2001 (Lafarge SA, 2001a§).

Gypsum.—France was one of Europe's largest producers of gypsum. Two-thirds of the production was from the Paris Basin. Four companies produced about 95% of the output. S.A. de Materiel de Construction was the largest company.

Potash.—Mines de Potasse d'Alsace S.A. (MDPA) was the principal producer of potash with two underground mines, Marie Louise and Amélie, which are located near Mulhouse, Alsace. MDPA announced that production would be stopped at the Amélie Mine in 2003. This was earlier than the planned closing in 2004. The Berrwiller Mine, which is near the Amélie Mine, closed in June 2001. Berrwiller was the remaining part of the Marie Louise Mine that MDPA began to close in 1999 when its ore became depleted (Industrial Minerals, 2001a).

Stone, Crushed.—Minerals Technologies Inc. of the United States announced that Speciality Minerals France (its wholly owned subsidiary) would construct and operate a satellite precipitated calcium carbonate (PCC) plant at Alizay, France. The plant will have a capacity of about 100,000 t/yr of PCC, which is used as a substitute for wood fiber and other more expensive pigments. The paper industry will be able to produce higher quality paper at a lower cost. Minerals Technologies originated the satellite concept for making and delivering PCC on site at paper mills. This concept has been a major factor in changing papermaking from an acid-based to an alkaline-based technology (Mineral Technologies Inc., 2001§).

Talc.—Talc de Luzenac S.A. was significant not only to the domestic market, but also to the European market. Borax Français S.A. (a subsidiary of Rio Tinto Corp.) purchased 92% of Talc de Luzenac. As a result of mergers and acquisitions during the past 6 years, Talc de Luzenac was formed as a subsidiary of Rio Tinto. Talc de Luzenac operated 16 deposits and 20 processing plants in Europe and North America and was the leading talc producer in the world (Société de l'Industrie Minérale, 2001b).

Mineral Fuels

France has few indigenous energy sources, only small amounts of coal, natural gas, and petroleum. The exploitation of these resources has steadily decreased during the past two decades, and nuclear power has dominated the energy supply sector.

Coal.—CdF was proceeding with further rationalizations that would result in reduced production. All but mines in the Lorraine area were closed by yearend 2000. The two deep mines still active in Lorraine, La Houve and Merlebach, were expected to close by 2005. Four open pit mines and one underground mine in the Centre-Midi Basin were still being worked mostly for lignite. CdF envisioned the final stoppage of all coal mining in France in accordance with the National Coal Pact signed in 1995. Although the Government recognized the total lack of any prospect of the French coal industry becoming competitive in the medium or long term, the seriousness of the social and regional problems has prevented the Government from keeping the 2002 deadline for a reduction of activity and programmed closures (Commission of the European Communities, 2001§).

Natural Gas and Petroleum.—In 2001, onshore petroleum production was mainly from the Aquitaine and Paris Basins. Because production had started to decline in these areas, the Government initiated a program to encourage exploration for new deposits in other areas thought to have potential; the Jura Basin was one area under consideration.

Companies that operated refineries in France included BP Amoco plc, ExxonMobil Corp., Royal Dutch Shell Group, and TotalFinaElf S.A., as well as other smaller companies. The structure of the industry was geared to gasoline production. France's crude oil refining capacity was 1.9 million barrels per day (bbl/d). The country's largest refining complex was TotalFinaElf's with a capacity of 446,000 bbl/d. Increasingly strict EU environmental regulations for refineries resulted in recent upgrades in the French refining sector. The regulations will become considerably more strict in 2005, and substantial investment in the refining sector will be necessary to meet these new mandatory targets. France was a net importer of petroleum products (U.S. Energy Information Administration, 2002§).

Nuclear Energy.—The Government had planned to have nuclear power reach 100% of electricity generation; environmental objections, however, have increased, and public opinion polls showed that a growing percentage of the public favors an end to nuclear power.

France was one of the few countries in the world with a nuclear reprocessing plant. COGEMA's La Hague facility received authorization from Direction de la Sûreté des Installations Nucléaires (Nuclear Installation Safety Directorate) to start operation of two new facilities for hull and end-pieces compacting and plutonium purification (U.S. Energy Information Administration, 2002§).

Outlook

Having one of the world's most developed economies, France was an advocate for the EU and the European single-market concept. The country has had to make considerable changes in the structure of its industries, particularly those mineral industries controlled by the State. Several state-owned companies have taken the initiative to become leaders in their respective industries. Others have been forced to make additional adjustments under rationalization schemes proposed by the EU or the French Government. The depletion of mineral resources and/or the cessation of subsidies for uneconomic operations have had impacts on local communities and their economies. France will have the advantage of plentiful electrical power to attract industrial facilities that required skilled workforces and good access to markets in Europe. If nuclear power is phased out, then imports of oil and gas would be required.

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Ministere de l'Industrie
DGEMP SMPSS
101 Rue de Grenelle
75353 Paris, France

TABLE 1
FRANCE: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/		1997	1998	1999 e/	2000 e/	2001 e/
METALS						
Aluminum:						
Bauxite, gross weight 3/	thousand tons	164	165 e/	160	185 r/	153 4/
Alumina:						
Crude	do.	570	570 e/	550	500	600
Calcined	do.	450	450 e/	450	462	480
Metal:						
Primary	do.	399	424	455 4/	441 4/	462 4/
Secondary	do.	242	240 e/	239 4/	260 r/ 4/	253 4/
Antimony metal, including regulus		650	600 e/	500	500	500
Cadmium metal		309	223 r/	195 4/	160 4/	176 4/
Cobalt metal:						
Powder		670	600 e/	600	600	600
Chloride		159	172 e/	180 r/ 4/	204 4/	199 4/
Copper:						
Mine output, Cu content		196	180 e/	100	100	--
Metal:						
Blister, secondary e/		1,490	1,079	1,000	1,000	1,000
Refined:						
Primary		5,800 e/	--	--	--	--
Secondary e/		29,800	22,400	1,800	1,500	1,500
Total		35,600	22,400 e/	1,800	1,500	1,500
Gold, mine output, Au content	kilograms	4,953	3,793	3,570	2,632 4/	2,510 4/
Iron and steel:						
Iron ore and concentrates:						
Gross weight	thousand tons	523	100	--	--	--
Fe content	do.	145 e/	28	--	--	--
Metal:						
Pig iron	do.	13,424	13,603	13,854 4/	13,661 4/	12,004 4/
Ferroalloys:						
Blast furnace, spiegeleisen, and ferromanganese		326	321 e/	302 4/	300	300
Electric furnace:						
Ferromanganese e/	thousand tons	100	100	138 r/ 4/	140	130
Ferrosilicon	do.	109	110 e/	100	110	100
Silicon metal	do.	66	65 e/	65	60	65
Other (Si, Ca, Mg)	do.	94	95 e/	100	100	100
Total		695	691 e/	705 r/	710	695
Steel, crude	do.	19,773	20,241	20,211 4/	21,002 4/	19,431 4/
Steel, hot rolled	do.	17,975	16,822	17,294 4/	17,722 4/	18,744 4/
Lead:						
Smelter, secondary e/		218,500	208,000	205,000 4/	209,000 4/	132,000
Refined:						
Primary		137,500	146,000 e/	124,000	109,868 4/	98,257 4/
Secondary		164,800	172,000	155,000	158,226 4/	143,338 4/
Total		302,300	318,000	279,000	268,094 4/	241,595 4/
Magnesium metal, including secondary		13,740	14,700	16,200	16,500	4,000 5/
Nickel metal 6/		8,750	9,778	9,458 r/ 4/	10,100 4/	11,033 4/
Silver: e/						
Mine output, Ag content	kilograms	1,770	1,027	1,140	720 4/	800
Metal, Ag content of final smelter products	do.	535	550	500	500	450
Tin, secondary		3,810	2,926	1,506 4/	1,257 4/	1,644 4/
Tungsten, powder		680	600 e/	500	500	500
Uranium:						
Mine output, U content		579	468	625	318 4/	182 4/
Chemical concentrate, U_3O_8 equivalent		487	453	424	302 4/	156 4/
Zinc metal, including slab and secondary		317,151	329,019	331,103 4/	347,705 4/	343,805 4/
INDUSTRIAL MINERALS						
Barite, $BaSO_3$ equivalent		77,000	75,000 e/	76,000	91,000	81,000 4/
Bromine, elemental e/		1,980	2,000	8,000	7,900 4/	7,800
Cement, hydraulic	thousand tons	19,780 e/	19,737 r/	19,527 4/	20,191 r/ 4/	19,839 4/
Clays:						
Kaolin and kaolinitic clay (marketable)	do.	332	333 e/	330	380 4/	375
Refractory clay, unspecified	do.	13	14 e/	14	12	14

See footnotes at end of table.

TABLE 1--Continued
FRANCE: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 3/		1997	1998	1999 e/	2000 e/	2001 e/
INDUSTRIAL MINERALS--Continued						
Diamonds, synthetic, industrial e/	thousand carats	3,600	3,600	3,600	3,600	3,600
Diatomite e/	thousand tons	80	80	75	75	85
Feldspar, crude e/	do.	621	706	638	642 4/	650
Fluorspar:						
Crude	do.	236	250 e/	250	250	250
Marketable:						
Acid- and ceramic-grade	do.	84	85 e/	86	85	95
Metalurgical-grade	do.	22	20 e/	20	20	20
Total	do.	106	105	106 4/	105 4/	115 4/
Gypsum and anhydrite, crude	do.	4,500	4,500 e/	4,500	4,500	4,500
Kyanite, andalusite, related materials e/	do.	67	70	70	65	65
Lime, quick and hyrated, dead-burned dolomite e/	do.	2,360	3,106	3,094 4/	3,000	3,000
Mica e/		8,000	10,000	10,000	10,000	10,000
Nitrogen, N content of ammonia	thousand tons	1,757	1,570 e/	1,580	1,620 r/	1,580
Pigments, mineral, natural, iron oxide e/		2,200	2,000	1,500	1,500	1,000
Phosphates, Thomas slag	thousand tons	44	50 e/	50	50	50
Potash, K_2O equivalent (marketable)	do.	725	453	345	321 r/ 4/	257 4/
Pozzolan and lapilli e/	do.	477	460	450	450	400
Salt:						
Rock salt e/	do.	371	300	100	386 r/ 4/	596 4/
Brine salt, refined	do.	1,475	1,500 e/	1,730	1,774 4/	1,727 4/
Marine salt e/	do.	1,188 4/	1,200	900	1,000	1,000
Salt in solution	do.	4,051	4,000 e/	4,050	3,956 4/	3,774 4/
Total	do.	7,085	7,000 e/	6,787 4/	7,120 r/	7,100
Sodium compounds: e/						
Soda ash	do.	1,053	1,000	1,000	1,000	1,000
Sodium sulfate	do.	120	120	120	120	120
Stone, sand and gravel: e/						
Limestone, agricultural and industrial	do.	11,433 4/	11,000	11,000	12,000	12,000
Slate, roof	do.	31	30	30	30	30
Sand and gravel:						
Industrial sands	do.	6,560 4/	6,500	6,500	5,359 r/ 4/	5,062 4/
Other sand, gravel, and aggregates	do.	164,000	165,000	165,000	181,020 r/ 4/	172,764 4/
Sulfur, byproduct:						
Of natural gas	do.	697	600	600	500	550
Of petroleum	do.	263	245	250	150	150
Of unspecified sources	do.	236	261	250	150	150
Total e/	do.	1,200	1,100	1,100	800	850
Talc:						
Crude		362,000	391,000	405,300 4/	376,000 r/ 4/	367,000 4/
Powder e/		300,000	300,000	300,000	300,000	300,000
MINERAL FUELS AND RELATED MATERIALS						
Asphaltic material e/		23,000	24,000	24,000	24,000	25,000
Carbon black e/		253,000	250,000	250,000	250,000	250,000
Coal, including briquets:						
Anthracite and bituminous	thousand tons	5,779	5,300	4,033 4/	3,805 4/	2,364 4/
Lignite	do.	690	800	894 4/	297 4/	324 4/
Total	do.	6,469	6,100	4,927 4/	4,102 4/	2,688 4/
Briquets e/	do.	250	250	163 4/	200	200
Coke, metallurgical e/	do.	3,900	4,000	5,312 4/	5,327 4/	5,091 4/
Gas, natural, marketed e/	million cubic meters	2,800	2,600	2,500	1,873 r/ 4/	1,810 4/
Petroleum:						
Crude	thousand 42-gallon barrels	13,104	13,000 e/	13,380 4/	11,591 r/ 4/	10,082 4/
Refinery products: e/						
Liquefied petroleum gas	do.	34,324 4/	34,000	29,012 4/	30,937 4/	29,000
Gasoline, all kinds	do.	145,954 4/	145,000	146,855 4/	132,107 4/	140,000
Kerosenes and jet fuel	do.	53,656 4/	54,000	52,948 4/	48,872 4/	48,800
Distillate fuel oil	do.	260,000	260,000	238,451 4/	250,417 4/	250,000
Residual fuel oil	do.	70,000	76,000	59,121 4/	57,776 4/	69,000
Other products	do.	125,000	100,000	46,872 4/	46,179 4/	45,000
Refinery fuel	do.	1,000	1,000	868 4/	1,148 4/	1,200
Total	do.	690,000	670,000	574,127 4/	567,436 4/	583,000

See footnotes at end of table.

TABLE 1--Continued
FRANCE: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

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e/ Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. r/ Revised. -- Zero.

1/ Table includes data available through August 2002.

2/ In addition to the commodities listed, France also produces germanium from domestic ores. Unfortunately, actual output is not regularly reported. France also produces large amounts of stone, but statistics on output are not available.

3/ Reprocessed bauxite not for metallurgical use.

4/ Reported figure.

5/ Plant closed in June 2001.

6/ Excludes secondary production from nickel/cadmium batteries.

TABLE 2
FRANCE: EXPORT AND IMPORT TRADE WITH THE UNITED STATES

(Million dollars)

Month	Exports	Imports
January	1,642	2,525
February	1,972	2,344
March	2,042	3,309
April	1,610	2,734
May	1,687	2,612
June	1,749	2,303
July	1,233	2,629
August	1,404	2,364
September	1,613	1,873
October	1,700	2,714
November	1,644	2,469
December	1,570	2,533
Total 1/	19,865	30,408

1/ Data may not add to totals shown because of independent rounding.

Source: U.S. Census Bureau, Foreign Trade Division, July 2001.

TABLE 3
FRANCE: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of facilities	Annual capacity
Alumina	Aluminium Pechiney	Plant at Gardanne	700
Aluminum	do.	Aluminum smelters at:	
Do.	do.	Saint-Jean-de-Maurienne, Savoie Province	120
Do.	do.	Noguères, Pyrénées, Atlantiques Province	115
Do.	do.	Lannemezan, Hautes-Pyrénées Province	63
Do.	do.	Auzat, Arièege Province	44
Andalusite	Denain-Anzin Minéraux Refractaire Ceramique	Glomel Mine, Brittany	75
Antimony, metal	Société Nouvelle des Mines de la Lucette	Plant at Le Genest, Mayeene Province	10
Barite	Barytine de Chaillac	Mine and plant at Chaillac, Indre Province	150
Do.	Société Industrielle du Centre	Mine at Rossigno, Indre Province	100
Bauxite	Aluminium Pechiney	Mines in Var Province (closed)	900
Cadmium tons	Compagnie Royal Asturienne des Mines	Plant at D'Auby-les-Douai, Nord Province	200
Cement	Eight companies, of which the largest are:	80 plants, including:	23,233
Do.	Lafarge SA	15 plants,	7,815
Do.	do.	Largest at St. Pierre-la-Cour	(1,160)
Do.	Société des Ciments Français	13 plants,	6,190
Do.	do.	Largest at Gargenville	(1,100)

TABLE 3--Continued
FRANCE: STRUCTURE OF THE MINERAL INDUSTRY FOR 2001

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of facilities	Annual capacity
Coal	Charbonnages de France (CdF) including:	Mines and washeries in:	12,000
Do.	Bassin de Centre-Midi	Middle France	(2,500)
Do.	Bassin de Lorraine	Eastern France	(9,500)
Cobalt, metal tons	Société Métallurgique Le Nickel (SLN)	Plant at Sandouville, near Le Havre	600
Copper, metal	Compagnie General d'Electrolyse du Palais	Electrolytic plant at Palais-sur-Vienne	45
Do.	Société Française d'Affinage du Cuivre.	Smelter at Poissy, Yvelines	11
Diatomite	Ceca S.A.	Mines and plants at Riom-les-Montagnne and St. Bauzille	100
Feldspar	Denain-Anzin Minéraux S.A.	Mine and plant at St. Chély d'Apcher	55
Ferroalloys	Société du Ferromanganese de Paris, Outreau	Plant at Boulogne-sur-Mer	420
Do.	Pechiney Electrométallurgie	Plants at Bellegarde	387
Do.	Chromeurope S.A.	Plant at Dunkerque	25
Fluorspar	Société Générale de Recherches et d'Exploitation Minière (SOGEREM)	Mines in southern France	150
Gold kilograms	Société des Mines du Bourneix (Government)	Mines in the Saint Yrieix la Perche District	4,000
Do. do.	Mines d'Or de Salsigne (Eltin Co., 51%, Ranger Co., 18%, Peter Hambro Plc., 10%)	Mine near Carcassonne	3,000
Gypsum	S.A. de Materiel de Construction	Mine at Taverny	1,500
Iron and steel:			
Steel	Usinor Group	Dunkerque	7,500
Do.	do.	Fos-sur-Mer	4,200
Do.	do.	Seramange	3,000
Do.	Sollac, Unimetal (Usinor Group, 100%)	Gadrange, Neuves Maisons, and Thonville	8,400
Kaolin	La Source Compagnie Minière	Kaolin d'Arvor Mine, Quessoy	300
Lead, metal	Métaleurop S.A.	Plant at Noyelles Godault	165
Magnesium, metal	Pechiney Electrométallurgie	Plant at Marignac (closed in 2001)	14
Natural gas million cubic meters	Société Nationale Elf Aquaitane (SNEA)	Gasfield and plant at Lacq	20,000
Nickel, metal	Société Métallurgia le Nickel (SLN)	Plant at Sandouville	16
Nitrogen, N content of ammonia	Grande Paroisse S.A.	Plant at Grandpuits	390
Petroleum:			
Crude barrels per day	Société National Elf Aquaitane (SNEA)	Paris Basin oilfields	1,000
Refined do.	TotalFinaElf S.A.	Refineries at Gonfreville and La Mede	446,000
Do.	Shell-Française	Refinery at Petite Couron	285,000
Do.	do.	Refinery at Berre	270,000
Do.	Elf Aquaitane-France	Refinery at Feyzin	120,000
Do.	do.	Refinery at Donges	200,000
Do.	do.	Refinery at Grandpuits	96,000
Do.	Société Française British Petroleum (S.F.B.P.)	Refineries at Lavera	175,000
Do.	Esso S.A.	Refineries at Fos-sur-Mer	237,000
Do.	Mobil Oil Française	Refineries at Gravenchon	62,000
Do.	Cie. Rhenane de Raffinage (CRR)	Refinery at Reichstett	80,000
Potash, K_2O	Mines de Potasse d' Alsace S.A. (MDPA)	Mines at Amélie and Marie-Louise (closed), Alsace	5,000
Salt, rock	Compagnie des Salins du Midi et des Salines de l'Est	Varangeville Mine at Saint-Nicolas-de-Port	9,000
Sulfur	Société Nationale Elf Aquaitane (SNEA)	Byproduct from natural gas, Lacq plant	3,000
Talc	Talc de Luzenac S.A. (Rio Tinto Corp, 100%)	Trimouns Mine near Ariège, Pyrenees	350
Uranium, U_3O_8 tons	Compagnie Général des Matières Nucléaires (COGEMA) (Government)	Mines at Limousin, Vendee, and Hérault	1,800
Zinc, metal	Umicore Group	Plant at Auby-les-Douai	220
Do.	Métaleurop S.A.	Plant at Noyelles Godault	110

THE MINERAL INDUSTRY OF

GERMANY

By Harold R. Newman

In 2001, Germany faced slower economic growth than at almost any time since reunification. The German economy was the world's third largest, after the United States and Japan, and accounted for about one-third of Europe's gross domestic product (GDP). The growth rate of real GDP was about 1.5% compared with 3.0% in 2000. The decrease stemmed from poor performance in the construction sector combined with sluggish consumer spending and a global downturn in technology sectors. Also, persistent high unemployment, high outstanding Government debt, an increased share of Government revenues that went for debt service payments, and growing social security and nonwage labor costs contributed to the problem. The unemployment rate of 9.3% continued to be a sensitive political and economic issue. The top priorities of the Government were to seek ways to increase economic growth and to continue the development of the five Länders (States) that make up eastern Germany. These areas were still dependent upon huge net resource transfers from the west via a variety of Federal and State social payments, entitlement and investment grants, and tax waiver incentives for investment and trade (U.S. Embassy, Berlin, Germany, 2002).

Government Policies and Programs

The Government's declared primary objective continued to be seeking ways to stimulate economic growth and employment and to get a grip on rising government debt. To this end, the Government was pursuing a combination of budget consolidation, growth incentives, and structural reform. Although the Government intervenes in the economy through the provision of subsidies to selected sectors and the ownership of some segments of the economy, competition and free enterprise are promoted as significant segments of Government policy.

Germany was one of the main supporters of European unification and a strong advocate of closer European economic integration. Its economic and commercial policies were increasingly determined by agreements among European Union (EU) members. In harmony with the Schengen Agreement, which became effective on March 26, 1995, most EU member states, which included Germany, agreed to discontinue border controls. This internal market has provided a boost for Germany's export-oriented economy as well as for the economies of other European countries.

On April 29, 1998, new energy legislation designed to introduce competition to the traditionally closed electricity and natural gas sectors came into force. The legislation abolished, among other things, utilities-demarcated monopoly supply areas and created a framework for third-party access to electricity grids and natural gas pipelines. Lignite (brown coal) mining in Germany will be protected from competition until 2005. In 2001, Germany was the world's largest lignite producer with about one-fifth of global output. Renewable and cogeneration plants have been given special significance under the new legislation (U.S. Energy Information Administration, 2001a§[1]).

In April 1998, Germany's constitutional court cleared the way for German membership in the European Monetary Union (EMU), and on April 23, 1998, the Bundestag (Germany's Parliament) voted to join the European single currency zone. The EMU began the process of creating a single European currency, referred to as the euro (€), by irrevocably setting the exchange rates of individual states on January 1, 1999. Individual member-states' currencies, which included the German deutsche mark, were phased out in early 2002 (U.S. Energy Information Administration, 2001a§).

Environmental Issues

The environment in Germany is the responsibility of the Federal Ministry for the Environment, Water Conservation and Nuclear Safety. Falling within its purview are the Federal Environment Agency in Berlin, the Federal Office for Nature Conservation in Bonn, and the Federal Office for Radiation Protection in Salzgitter.

Environmental concerns that relate to mining are addressed under the Federal mining law and its provisions for environmental impact assessments that must be completed before mining can start. The objective of the assessment is to identify and evaluate all environmental consequences of a planned project by taking into account various design options. The environmental evaluation process in Germany presents a risk for the company involved because project approval is not guaranteed even after completion of the assessment, which usually involves considerable time and resources.

Improvements in all polluting sectors have been marked; transportation continued to represent the largest source of air pollution. In 2001, more than 44 million cars and 4.5 million trucks were on German roads. Consequently, environmental policy has been tied directly to transportation policy (U.S. Energy Information Administration, 2001§).

Production

Production in the mining and metals industries depended on a variety of factors that included the availability of materials and supply and demand. The easing of the worldwide recession was a positive factor for those industries that depended on exporting their products. The importance of certain sectors of the German mining industry has decreased steadily during the past decade. Notwithstanding the general contraction of the industry, the production levels of certain minerals remain important domestically and on a worldwide scale. Even though its underground mining sector has shrunk significantly in recent years, Germany has remained a world leader in the mining equipment manufacturing sector. The high costs of production in Germany compared with those of competing foreign producers and the problems caused by trying to balance production between the reunified former German Democratic Republic (GDR) and former Federal Republic of Germany (FRG) helped constrain production (table 1).

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[1] References that include a section twist (§) are found in the Internet References Cited section.

Trade

Germany was one of the world's major trading nations. About one-third of its GDP depended on exports. On average, one job in four depended on trade. Two-way United States-German trade was worth more than $80 billion in 2000. Germany was the United States' leading European trading partner. Outside the EU, the United States and Japan were Germany's major trading partners (Müller, 2001).

As a major mineral processing nation, Germany relied mainly on imports to feed the metals processing industry, which transformed raw materials into products that supplied the manufacturing industry and provided the bulk of the country's exported materials. The nonferrous metallurgical industry provided its raw materials by imports and recycling. Supply of precious metals originated from domestic nonferrous refineries, domestic supply of scrap, and imports of wrought metal and scrap. In 2000, German consumption of nonferrous metals (aluminum, copper, lead, tin, and zinc) amounted to almost 4 million metric tons (Mt) (Bundesanstalt für Geowissenschaften und Rohstoffe, 2000).

With the exception of potash and rock salt, feldspar is the sole industrial mineral for which Germany is independent from imports. In 2000 (the latest year for which data are available), Germany's import dependence on other industrial minerals was as follows: 35% for kaolin and bentonite, and 70% for barite and natural graphite (Bundesanstalt für Geowissenschaften und Rohstoffe, 2000).

The rationalization of the German steel industry has resulted in a reduction in steel production capacity. This led to a drop in imported raw materials, especially iron ore and coking coke, which previously represented a large sector of the dry bulk tonnage processed through the country's leading ports. Coupled with this, the planned closure of Germany's loss-making coal mines has been slower than anticipated, which has postponed the estimated increase in demand for steaming coal imports (Bulk Materials International, 2002b, p. 10).

Structure of the Mineral Industry

The structure of the industry in Germany and the principal companies operating in the production and processing of metals and minerals are listed in table 2. Most of the producing and processing facilities still in operation were small compared with those in the former FRG, except for lignite and potash, both of which were very large operations. The restructuring and privatization of the facilities in the former GDR continued in 2001. The Treuhandanstalt (Interest Management Association) retained control of a few companies until they were sold or closed.

Commodity Review

Metals

Alumina.—Treibacher Schleifmittel AG purchased a majority share of Surfatec Elektroschmelze Zschornewitz GmbH & Co. The two companies have had a close working relationship for several years. Surfatec, which was one of the oldest fused alumina operations in Europe, produced about 15,000 t/yr of white, pink, and brown fused aluminas for the bonded abrasive and refractory markets. Surfatec's main product was a low-soda white fused alumina [99.7% aluminum oxide (Al_2O_3)] for abrasive and refractory applications. It also produced chrome-toughened pink [99.4% Al_2O_3, 0.3% chrome oxide (Cr_2O_3)] and red (97.7% Al_2O_3, 2.0% Cr_2O_3) abrasive aluminas and a 96.1% Al_2O_3 brown fused alumina (Industrial Minerals, 2001c).

Aluminum.—In 2001, Germany's primary aluminum industry was the largest in the EU, although it was considered to be medium sized when compared with other world producers. VAW Aluminium AG (VAW), which was a member of VIAG Group, accounted for more than 75% of the country's primary aluminum production. VAW's wholly owned aluminum smelters in Germany and its participating interests in smelters abroad ensured the supply of input metal for the company's downstream fabricating operations.

Alcoa Inc. announced it had completed the sale of 50% of Aluminium Oxide Stade GmbH alumina refinery in Stade to Dadco Alumina and Chemicals Ltd. Terms were not disclosed. VAW owned the remaining interest. The sale was required under EU regulatory approval that cleared Alcoa's acquisition of Reynolds Metals Co. in mid-2000 (Alcoa Inc., 2001§).

Norsk Hydro ASA of Norway agreed to buy VAW from the German utility group E.ON AG for about $3 billion. E.ON was seeking to sell VAW to concentrate on its core business of energy. Norsk expected to achieve cost savings with the merger of VAW with its own aluminum business. The deal remains subject to approval of the European Commission (Mining Journal, 2001).

High-pressure die casting dominated aluminum foundry production in Germany and accounted for more than 55% of output followed by gravity/low-pressure die casting with almost 35% share and finally sand casting with less than 9%; other casting methods made up the balance. The market for light metal castings was dominated by the automotive sector whose share of sales rose to more than 70% in 2001 from about 67% in 1993. The actual importance of this sector was even higher than these figures suggest because most of the castings exported end up in some kind of a vehicle (Metal Bulletin Monthly, 2001a).

Copper.—Norddeutsche Affinerie AG (NA) completed two major projects—the posttakeover of the world's largest secondary copper producer Hüttenwerke Kayser AG (HK) in Lünen and the expansion of NA's flash smelter, which treated 1 Mt of copper concentrate in 2001. NA operated the custom smelter and refinery at Hamburg and was the world's fifth largest custom copper smelter with a production capacity of about 500,000 metric tons per year (t/yr) of copper cathode, 320,000 t/yr of copper rod, and 176,000 t/yr of copper billets and cake (Metal Bulletin Monthly, 2001b).

Steel.—Europe's steel industry may look patchy to some observers, but it is the most consolidated in the world. European steel producers included Usinor Group [24-million- metric-ton-per-year (Mt/yr) capacity], Corus Group (22.9-Mt/yr capacity), Arbed Group (22.4-Mt/yr capacity), Thyssen Krupp Group (18.9-Mt/yr capacity), and Riva Group (14-Mt/yr capacity) and accounted for more than 100 Mt/yr of raw steel capacity, which was about one-half of the EU total. In 2001, Germany was estimated to have produced almost 45 Mt of steel. Thyssen Krupp, which was the largest company, produced around 16 Mt (Steel Times, 2001, p. 18).

Germany's number two steelmaker was Saltzgitter AG whose production rose to more than 8 Mt in 2001. Saltzgitter, which was the biggest seamless tube and pipe producer in Western Europe, continued to reap dividends from its purchase of Mannesmannröhren Werk in 2000. Results from the first 9 months of 2001 showed the company holding on to a strong position despite the downturn in the European steel economy (Metal Bulletin, 2001d).

A German court freed engineering steel and wire rod producer Saarstahl AG from bankruptcy in December 2001. The shareholders stated they would continue to run Saarstahl as a long-term business. Also, a decision was made to invest in an upgrade of the continuous casting area of the steel shop at Völkingen. The company entered bankruptcy administration in 1993 (Metal Bulletin, 2001a).

Preussag Stahl AG was a steel producer that supplied specially welded large pipes for long-distance petroleum and natural gas pipelines as well as flats and beams. Built to advanced technological standards, the Preussag electric steel works, which had been brought online in Peine in late 1997, had a capacity of 750,000 t/yr (Steel Times, 2001, p. 19).

Zinc.—MIM Holdings Ltd. of Australia stated that it no longer regarded its zinc smelting operations in Duisburg, Germany, and Avonmouth, United Kingdom, as part of its core business and was investigating options for exiting the European smelting business. In 2000, the Duisburg smelter produced 90,000 metric tons (t) of zinc and 31,000 t of lead/silver bullion, and the Avonmouth smelter produced 78,000 t zinc and 30,000 t of lead/silver bullion. MIM stated that the primary reason it bought the smelters at Duisburg and Avonmouth was to take the concentrates from the McArthur River Mine in Northern Territory, Australia, but this was no longer necessary because other markets were developed for the mine's concentrates (Metal Bulletin, 2001b).

Industrial Minerals

Cement.—The privatization process launched by Treuhandstalt, which was the State holding company, 11 years ago in East Germany has resulted in a more fragmented industry and a more diversified range of companies than in other European countries. In 2001, seven cement producers and three or four importers competed in an East German market of only 7 Mt. The slowdown of construction in Germany in 2001 affected the cement sector, and profitability continued to fall in the building materials sector. Construction spending has fallen by more than 25% in the new Länders since its 1996 peak. The rate of spending decline (-12.1%) was particularly noticeable in 2001 (Pinatel and Lefèvre-Moulenq, 2002).

Clays.—Between 140 and 160 small- to medium-sized clay mines were in operation in 2000 in Germany. About one-half of the high-quality refractory and ceramic clays produced were from the Rhineland-Palatinate area. Production in Bavaria was concentrated in the Oberfalz area.

Germany was the second largest producer of kaolin in Western Europe after the United Kingdom. Most German kaolin was mined in Bavaria, and Amberger Kaolinwerke GmbH was the largest producer with mines in Hirschau.

In terms of overseas developments, Süd-Chemie AG was the largest bentonite producer in Europe. The company controlled or had minority interests in companies in France, Indonesia, Mexico, the Republic of Korea, Turkey, and the United States. Süd-Chemie's main business was in Gammelsdorf, Bavaria, where it produced calcium, sodium, and acid-activated, bentonite products.

After S&B Minerals Beteiligungs GmbH acquired the remaining 25.1% stake in IKO-Erbsloeh GmbH & Co. (IKO-E), this brought S&B's holdings to 100%. IKO-E, which was headquartered in Marl, was a supplier of speciality bentonite products. It supplied materials to the refactory market and foundry moulding market. It also supplied building and drilling bentonite, feed additives, and additives to the paint and paper industries. S&B continued to develop a supply network that would connect the final consumers of bentonites with the production of these ores, thus eliminating any intermediaries (Industrial Minerals, 2001a).

Graphite.—Graphitwerk Kropfmühl AG was the only company that mined and processed natural graphite in Germany. The company operated a mine and plant at Kropfmühl, Passau, and a plant at Werk Wedel, Holstein. About one-half of the company's production, which has been falling in recent years because of declining reserves, went into the European refractory industry.

Gypsum.—Germany was a major European producer of crude gypsum. The largest German producer of gypsum Gipswerke Dr. Karl Würth GmbH accounted for more than two-thirds of gypsum production. The company operated a mine and plant in Lower Saxony. The second largest producer Gyproc GmbH Banstoff Production & Co. KG operated mines in Lower Saxony.

Lafarge Gips GmbH (the German gypsum division of the Larfarge Group of France, was to construct a plasterboard plant in Lippendorf, which will use synthetic gypsum from a nearby power station as its principal raw materials. Lafarge planned to achieve a production capacity of 20 million square meters of plasterboard by 2002 as well as semihydrate for plaster products. The proximity of the plant to the Lippendorf power station will provide Lafarge with high-quality synthetic gypsum formed from the desulfurization of flue gas and will offer immediate savings on logistical costs. The plant, which is located 20 kilometers south of Leipzig, is within easy reach of Austrian and German markets (Industrial Minerals, 2001b).

Magnesium.—Thyssen Krupp Stahl AG set up a new company, Magnesium Flachprodukte GmbH, to carry out research and development into the production of magnesium sheet that would be used in automobile production. Thyssen Krupp, which had been formed by the merger of the steel interests of Thyssen AG and Krupp AG had been looking for light- weight material for the automotive sector. Magnesium is mainly used in the automobile industry in castings; Thyssen Krupp, however, was interested in developing rolled flat products for use in vehicle production. The Saxony State Ministry for Economics & Labor will provide funds for the project; the ultimate aim will be to set up an industrial center for magnesium technology in the region (Metal Bulletin, 2001c).

Potash.—After closings and restructuring, Kali und Salz AG (K+S) operated six mines in four potash districts and had a potassium chloride production capacity of 4 Mt/yr; its product grades were 2 Mt/yr of standard grade and 2 Mt/yr of granular grade. Germany was the third largest potash producer in the world after Canada and Russia. K+S had 13% of the world potash market and a 30% share of the market for potassium sulphate. K+S's largest operation Zielitz Mine underwent a major investment program that resulted in a practically new potash operation (Kali and Salz Group, 2001).

Salt.—K+S and Solvay S.A. of Belgium joined forces on the European salt market. The partners signed an agreement creating a joint venture, European Salt Company (ESCO), that would encompass their salt activities and whose output was intended for third parties. K+S would hold 62% of the new company, and Solvay would own the remaining 38%; this reflected the value of the businesses that both partners brought to the joint venture. ESCO would have a production of about 5 Mt/yr with facilities in Belgium, France, Germany, the Netherlands, Portugal, and Spain (Solvay S.A., 2002§).

K+S started a new production facility at its Sigmundshall potash plant. Production at the plant was based on mining previously untapped reserves of hard salt at the Bokeloh Mine, which are expected to last about 20 years. The facility was designed with a capacity of 300,000 t/yr. Raw salt from the mine was to be processed above ground by using the electrostatic separation process (ESTA®), which was developed by K+S. ESTA® has been used at several sites and has been particularly kind to the environment because it does not require water (K+S Group, 2001§).

Mineral Fuels

Germany has relatively insignificant domestic energy sources and is heavily import-reliant to meet its energy needs. In 2001, the most important energy source in Germany's consumption of primary energy was petroleum with a 41% share of total consumption. About 30% of Germany's energy requirements was satisfied from domestic sources; the remaining 70% was imported. By 2020, the share of imports was expected to rise to 80%; oil was still expected to remain the primary energy source. About 21% of electrical generation was supplied by 19 nuclear plants. The Government signed an agreement with the utility companies to phase out nuclear power generation by 2021 (U.S. Energy Information Administration, 2001a).

German power producers were building four new powerplants with a total capacity of 2,267 megawatts (MW). By 2003, these new powerplants will replace older ones. RWE Rheinbraun AG will build a 965-MW coal-fired plant, which will come online in 2002. RWE Power AG will build a 225- MW gas-fired plant, which will come online at the end of 2002. VEAG Power AG was building a pump storage plant with four reactors at 264 MW to come online 2003. MVV Mannheim AG was building a 20-MW biomass plant, which was to start production in mid-2003. Germany had 112,000 MW of powerplants on the power grid (Alexander's Gas and Oil Connections, 2001b§).

E.ON agreed to buy PowerGen of the United Kingdom for $14 billion in cash and assumed debt, thus creating Europe's second biggest electricity company. The acquisition, which was the biggest cross-border purchase in the European utilities industry, gave E.ON its first foothold in the United Kingdom. PowerGen's power stations produced enough electricity to supply the homes of more than 8 million people in the United Kingdom. Deregulation of Europe's energy markets was driving companies to expand abroad to counter increased rivalry at home (Alexander's Gas and Oil Connections, 2001a§).

Coal.—***Anthracite and Bituminous Coal.***—The gradual phase-out of subsidies that have supported Western Europe's coal industry for so long was continuing. This was in line with EU policy to eliminate subsidies to industries. The reduction in subsidies was to be significant, and inefficient mines were to be closed.

Germany imported close to 40 Mt of hard coal in 2001; this was the first time the country had imported more coal than it produced. German mines produced more than 27 Mt, and it was likely that another 1.5 Mt would be cut in 2002; there were no plans for major mine closures. Poland was the main source with about 10 Mt, although Colombia and South Africa were becoming increasingly more important sources. Imports from the United States were down and were expected to continue to decline (Bulk Materials International, 2002a).

Lignite.—Mining was mainly in the Rheinish area to the west of Cologne and the Lusatian area near Dresden. Lignite mining was under less economic pressure than hard coal mining.

The completion of the so-called Retrofit Program of RWE Rheinbraun brought back into operation the generating block at the Niederaussem powerplant. More than 300 MW of power has been added to the program and will start to supply the power grid in 2003. The new plant will require less coal and significantly reduce carbon dioxide emissions (Engineering and Mining Journal, 2001).

Renewable Energy.—The wind power sector has continued its strong expansion. After 1,115 new units were installed during the first 9 months of 2001, 10,500 wind generators were in operation with an installed capacity of 7,500 MW. The installed capacity, which was up 23% from that of 2000, can produce one-third of the electricity that Germany's nuclear powerplants were producing (Alexander's Gas and Oil Connections, 2001d§).

The Government approved a project to build the world's first wind-propelled electricity power station in the high seas. The project will be located in the North Sea 45 kilometers (km) off the island of Borkum outside the 12-sea-mile sovereign zone of Germany and will be fastened by steel structure in 30 meters (m) of deep water. The project will involve 208 wind propellers that will generate 1,000 MW of electricity. The estimated cost of the project was $1.5 billion (Alexander's Gas and Oil Connection's, 2001c§).

Uranium.—The ongoing cleanup of the former Soviet Union uranium mining operations in the former GDR was viewed as Europe's biggest mine rehabilitation project. When the Wismut Mines were in production, the only goal was to maximize uranium output. This resulted in an environmental problem of "monumental proportions." At various sites, 48 waste rock piles covered a surface area of about 15 square kilometers (km²) that contained about 311 million cubic meters of waste material. In addition, 14 tailing ponds contained 160 million cubic meters of residues from uranium ore processing plants and covered a surface area of 7 km². The German Government was expected to spend more than $9 billion on this rehabilitation project during the next 10 to 15 years (Engineering and Mining Journal, 1999). Continuing remediation work in 2001 focused on decommissioning facilities and immobilizing contaminated material in a manner that would limit long-term hazards to humans and the environment.

Infrastructure

Germany had a total of 636,282 km of highways and roads that ranged from the high-speed autobahn system to undeveloped gravel-and-packed-dirt country roads. Of this total, paved highway was 501,282 km, and unpaved was 135,000 km. The railroad system included 45,468 km of track, about 90% of which was Government owned. Of this total, 44,769 km was 1.435-m standard-gauge track, and 699 km was 1.000-m gauge track. Germany had 600 airports. Pipelines included a 3,644-km line for crude petroleum, a 3,964-km line for refined products, and a 97,564-km line for natural gas. Inland waterways and canals consisted of 7,541 km and 31 major ports; the Kiel Canal served as an important connection between the Baltic and North Seas, and the Rhine-Main-Danube Canal served as a connection between the North and Black Seas. The major maritime ports of Hamburg, Rostock, Bremerhaven, Bremen, and Wihelmshaven, in descending order, accounted for about 70% of total merchandise traffic.

Outlook

Germany's economy grew more slowly during 2001 compared with 2000 and may be on the verge of a slight contraction. This could be offset if growth in Germany's international trading partners increases. Industrial production is expected to remain around current levels. Export-led growth has diminished as the global economy lost momentum. Restructuring industries, which included mineral-resource industries, to be more efficient may result in increased unemployment, which, in turn, would cut into the available resources of the Federal Government in the form of payments for unemployment compensation, retraining, and other social costs. This is expected to continue in the short term.

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Bundesministerium für Forschung und Technologie [Federal Ministry for Research and Technology]
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Bundesministerium für Wirtschaft, Abteiling III, Energiepolitik, Mineralische Rohstoffe [Federal Ministry for Economics, Section III, Energy Policy and Mineral Raw Materials]
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TABLE 1
GERMANY: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity		1997	1998	1999	2000	2001 e/
METALS						
Aluminum:						
Alumina, Al_2O_3 equivalent						
Calcined	thousand tons	738	600 e/	583	500 e/	520
Hydrate e/	do.	800 3/	700	700	652 3/	650
Metal:						
Primary		571,944	612,381	633,804	643,545	651,600 3/
Secondary		432,467	453,328	482,658	572,257	620,300 3/
Arsenic, white, Ar_2O_3 content e/		250	200	200	200	200
Cadmium, metal, refinery including secondary		1,145	1,020	1,145	458 r/	539 3/
Cobalt, metal including alloys e/		600	500	500	500	500
Copper, metal:						
Smelter:						
Primary		273,100	258,600	266,400	275,000 e/	256,400
Secondary e/		76,000	80,000 3/	60,000	75,000	60,000
Refined:						
Primary		297,800	322,800	271,000	335,000 e/	334,000
Secondary		375,800	373,000	425,000	375,000 e/	375,000
Iron and steel:						
Ore and concentrate:						
Gross weight		200,900	100,000 e/	--	--	--
Fe content		28,100	14,000 e/	--	--	--
Metal:						
Pig iron	thousand tons	30,939	30,162	27,932	30,846	29,184 3/
Ferroalloys e/ 4/	do.	96 3/	100	90	80	72
Of which ferrochromium	do.	26	21	17	22 r/	19 3/
Steel, crude	do.	45,009	44,046	42,056	46,376	44,803 3/
Semimanufactures	do.	37,074	36,591	35,879	38,974	37,011 3/
Lead, metal:						
Smelter		161,300	100,000 e/	160,600	170,000 e/	155,900 3/
Refined:						
Primary		164,800	176,800	169,557	210,515	153,743 3/
Secondary		164,400	203,400	204,000	204,000 e/	219,640 3/
Platinum-group metals, metal, refined e/	kilograms	60,000	60,000	60,000	50,000	50,000
Selenium, metal	do.	115,000 r/	100,000 r/	100,000 r/	100,000 r/ e/	100,000
Silver, metal, refined e/	do.	500,000	500,000	500,000	500,000	500,000
Tin, metal, primary and secondary e/		15,708 3/	1,000	1,000	500	100
Uranium, concentrate, U_3O_8 content		27	25 e/	25 e/	28	26
Zinc, metal including secondary		317,681	333,968	332,852	327,500 r/	358,300 3/
INDUSTRIAL MINERALS						
Abrasives: e/						
Natural, pumice		212,000	300,000	250,000	200,000	200,000
Artificial, corundum		60,000	60,000	50,000	60,000	60,000
Barite, marketable (contained $BaSO_4$)		118,698	123,300	118,500	111,800	108,100 3/
Boron materials, processed borax e/		1,200	1,200	1,000	1,000	1,000
Bromine e/		700	600	500	500	500
Cement:						
Clinker (intended for market) e/	thousand tons	1,200	1,000	1,000	1,000	1,000
Hydraulic	do.	37,000 e/	36,610	36,219 r/	35,207 r/	30,989 3/
Chalk, crude including ground	do.	425	400	400 e/	1,061 r/	1,045 3/
Clays:						
Bentonite	do.	511	509	477	465	448 3/
Ceramic clay	do.	3,500 e/	5,000 e/	3,543	4,100	3,900
Fire clay e/	do.	1,000	1,000	1,000	1,000	1,000
Fuller's earth e/	do.	500	600	500	500	500
Kaolin, marketable	do.	1,800 e/	3,400	3,543	3,655	3,779 3/
Other, including brick clay	do.	22,000	20,000	20,000 e/	21,000 e/	20,000
Diatomite	do.	--	54	53	54	50
Feldspar e/		455,969 3/	460,000	500,000	544,000	500,000
Fluorspar:						
Acid-grade e/		22,500	25,000	26,800	29,600	30,000
Metallurgical-grade e/		1,500	1,500	1,500	1,500	400
Total		24,000 e/	26,500 e/	28,300	31,100	30,400 3/

See footnotes at end of table.

TABLE 1--Continued
GERMANY: PRODUCTION OF MINERAL COMMODITIES 1/ 2/ 3/

(Metric tons unless otherwise specified)

Commodity		1997	1998	1999	2000	2001 e/
INDUSTRIAL MINERALS--Continued						
Graphite, marketable		1,030	270	300	300 e/	300
Gypsum and anhydrite, marketable e/	thousand tons	3,000	4,000	4,600	2,300 r/	2,000
Lime, quicklime, dead-burned dolomite	do.	7,600 e/	7,000 e/	6,440	6,850	6,900
Magnesium salts (byproduct of potash mining) e/	do.	1,200	1,200	1,200	1,200	1,200
Nitrogen, N content of ammonia	do.	2,471	2,512	2,406	2,473	2,522 3/
Phosphate materials: e/						
Phosphatic fertilizers, P_2O_5 content		800	700	700	700	700
Thomas slag:						
Gross weight	thousand tons	150	150	150	200	200
P_2O_5 content		19,000	19,000	19,000	20,000	20,000
Pigments, mineral, natural e/		4,176 3/	4,000	4,000	4,000	3,000
Potash, K_2O content	thousand tons	3,423	3,582	3,543	3,407	3,549 3/
Pumice, marketable e/	do.	600	600	500	500	500
Salt, marketable:						
Evaporated	do.	700 e/	9,098	8,965	9,322	8,456 3/
Rock and other		15,087	5,056	6,921	4,904	5,052 3/
Sodium compounds, n.e.s.: e/						
Soda ash, manufactured	thousand tons	1,400	1,400	1,400	1,500	1,500
Sulfate, manufactured	do.	100	100	100	100	100
Stone, sand and gravel:						
Stone:						
Dimension, crude and partly worked e/		100,000	100,000	100,000	100,000	100,000
Dolomite and limestone, industrial	thousand tons	68,000 e/	71,900	81,000	75,151 r/	68,552 3/
Quartz and quartzite e/		26,000	25,000 3/	25,000	25,000	25,000
Slate e/		70,000	70,000 3/	70,000	70,000	70,000
Sand and gravel:						
Building sand and gravel	thousand tons	382,000	372,500	382,700	343,200	324,200 3/
Gravel including terrazzo splits e/	do.	200,000	200,000	200,000	200,000	200,000
Sand:						
Foundry	do.	4,000 e/	3,500	3,500	3,500 e/	3,000
Industrial (glass) e/	do.	9,800	10,000	10,000	8,500	8,500
Sulfur, byproduct: e/						
Of metallurgy	thousand tons	25	25	25	30	30
Of natural gas and petroleum	do.	1,085 3/	1,100	1,135 3/	1,026 r/	988 3/
Other	do.	50	50	60	100	100
Total	do.	1,160	1,175	1,220	1,156 r/	1,118
Talc and steatite e/		8,819 3/	9,000	9,000	8,000	7,000
MINERAL FUELS AND RELATED MATERIALS						
Asphalt and bitumen, natural e/		11,285 3/	10,000	9,000	10,000	10,000
Coal:						
Anthracite and bituminous, marketable	thousand tons	46,792	40,960	43,849	33,590 r/	27,361 3/
Lignite	do.	177,099	166,035	162,242	168,051	175,364 3/
Coke:						
Of anthracite and bituminous coal	do.	10,744	10,277	8,568	9,115	7,289 3/
Of lignite e/	do.	185 3/	175	175	175	173
Fuel briquets:						
Of anthracite and bituminous coal	do.	322	185	174	146	140
Of lignite (including dust and dried)	do.	3,539	2,345	2,072	1,819 r/	1,740 3/
Gas: e/						
Manufactured:						
Blast furnace	million cubic meters	4,655 3/	4,500	4,000	4,000	4,000
Coke oven	do.	2,539 3/	2,500	2,000	2,000	2,000
Total	do.	7,194 3/	7,000	6,000	6,000	6,000
Natural:						
Gross	do.	22,473 3/	22,000	23,000	22,000	22,000
Marketed	do.	20,780 3/	19,900 3/	21,200 3/	21,720	21,698 3/
Peat:						
Agricultural use	thousand cubic meters	2,800 r/	9,561	9,473	9,648 3/	9,722 3/
Fuel use	do.	180,000	175,000	175,000 e/	160,000 e/	150,000
Petroleum:						
Crude	thousand 42-gallon barrels	20,361	21,146	19,728	22,658	23,603 3/

See footnotes at end of table.

TABLE 1--Continued
GERMANY: PRODUCTION OF MINERAL COMMODITIES 1/ 2/ 3/

(Metric tons unless otherwise specified)

Commodity		1997	1998	1999	2000	2001 e/
MINERAL FUELS AND RELATED MATERIALS--Continued						
Petroleum--Continued:						
Refinery products:						
Liquefied petroleum gas	thousand 42-gallon barrels	29,208	29,255	31,888	32,688	35,032 3/
Gasoline including aviation	do.	219,311	223,465	228,038	229,101	293,378 3/
Naphtha	do.	73,925	81,379	82,648	82,085	82,548 3/
Mineral jelly and wax	do.	3,600 e/	1,527	1,472	1,575	1,554 3/
Kerosene and jet fuel	do.	28,094	211,676	233,046	234,461	227,153 3/
Distillate fuel oil	do.	338,744	265,555	343,167	345,637	349,853 3/
Refinery gas	do.	2,821	3,227	2,706	3,269	3,276 3/
Lubricants	do.	4,800 e/	10,787	11,298	10,556	10,675 3/
Nonlubricating oils	do.	7,000 e/	7,867	8,197	8,100	7,197 3/
Residual fuel oil	do.	70,216	14,626	67,399	75,756	76,257 3/
Bitumen and other residues e/	do.	26,000 e/	16,968	22,228	22,592	19,450 3/
Bituminous mixtures	do.	1,200 e/	1,211	1,199	1,210	1,100 3/
Petroleum coke	do.	7,399	7,539	10,428	5,819	9,328 3/
Unspecified	do.	16,000	18,242	16,254	11,977	9,919 3/
Total	do.	828,000 e/	893,324	859,968	1,064,826	1,090,720 3/

e/ Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. r/ Revised. -- Zero.

1/ Table contains data available through August 2002.

2/ Data are from a combined Germany.

3/ Reported figure.

4/ Includes speigeleisen, unspecified crude iron, and blast furnace ferromanganese with 2% or more carbon.

TABLE 2
GERMANY: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Alumina		VAW Aluminium AG (VAW)	Plant at Schwandorf (special aluminas)	430
Do.		Aluminium Oxid Stade GmbH (VAW, 50%, Dadco Alumina and Chemicals Ltd., 50%)	Plant at Stade	750
Do.		Martinswerke GmbH (Alusuisse, 100%)	Plant at Bergheim (fused alumina)	350
Aluminum		VAW Aluminium AG	Smelters: Innwerke at Töging, Elbewerke at Stade, Rheinwerke at Neuss, Lippenwerke at Lünen (secondary)	300
Do.		Aluminium Essen GmbH	Smelter at Essen-Borbeck	95
Do.		Hamburger Aluminium-Werke GmbH (VAW, 33%)	Smelter at Hamburg	120
Arsenic, metal	tons	Metaleurop Handel GmbH	Plant at Langelsheim	5
Cement		38 companies, of which the major ones are:	64 mills (grinding) including:	59,000
Do.		Heidelberger Zement AG	Plants at Blaubeuren-Schelklingen, Leimen, Hassmersheim, Burglengenfeld, Kieferssfelden, and others	(9,200)
Do.		Dyckerhoff AG	Plants at Amoneburg, Golheim, Neuwied, Neubeckum, and others	(7,250)
Do.		E. Schwenk, Zementwerke KG	Plants at Allmendingen, Karlstadt, and Mergelstetten	(6,000)
Do.		Anneliese Zementwerke AG	Plants at Ennigerloh-Nord, Ennigerloh-Süd, Geske, and Paderborn	(3,500)
Do.		Zementwerke Deunan GmbH	Plant at Deuna	(3,000)
Chalk		Kreidewerke Rugen GmbH	Quarries on Rugen Island	500
Coal, anthracite and bituminous		Four companies, including:	About 27 mines, including:	72,500
Do.		Ruhrkohle AG	14 mines in Ruhr region	(40,000)
Do.		Saarbergwerke AG	5 mines in Saar basin	(14,000)
Do.		Preussag Anthrazit GmbH	Mine at Ibbenbüren	(2,500)

TABLE 2--Continued
GERMANY: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Copper	Norddeutsche Affinerie AG (Dresdner Bank AG, 20%; Degussa AG, 10%)	Smelter and refinery at Hamburg	500 350
Do.	Hüttenwerke Kayser AG	Refinery at Lünen	120
Kaolin	Kemmlitzer Kaolinwerke GmbH	Mines at Gröppendorf, Oschatz, and Sachsen	100
Do.	Do.	Plant at Sachen	100
Limestone	Harz Kalk GmbH	Quarries at Bad Kösen, Rubelaand, and Kaltes Tal	6,000
Lead	Metaleurop Weser Blei GmbH	Smelter and refinery at Nordenham	120
Do.	Berzelius Metallhütten GmbH	QSL smelter at Stolberg	75
Do.	do.	Refinery at Duisberg	120
Do.	Norddeutsche Affinerie AG	Refinery at Hamburg	50
Lignite	Rheinische Braunkohlenwerke AG (Rheinbraun)	Surface mines in Rhenish mining area: Garzweiler, Bergheim, Inden, and Hambach	105,000
Do.	Lausitzer Braunkohle AG (LAUBAG)	Surface mines in Lausatian mining area: Jänschwalde/Cottbus-Nord, Welzow-Süd, and Nochten/Reichswalde	50,000
Natural gas million cubic meters	Brigitta Erdgas und Erdöl GmbH and Elwerath Erdgas-Erdöl GmbH	Plants at Clenze and Grossenkmeten	9,500
Do. do.	Mobil Erdgas-Erdöl GmbH	Plants at Scholen	4,000
Do. do.	Other companies	Plants at Duste, Rutenbrock, and others	2,000
Petroleum:			
Crude thousand 42-gallon barrels	The largest companies are:	6 areas with about 85 oilfields, including:	80,000
Do. do.	Elwerath Erdgas-Erdöl GmbH	West of Ems River	(30,000)
Do. do.	Wintershall AG	Weser-Ems Rivers	(21,000)
Do. do.	Deutsche Texaco AG	Elbe-Weser Rivers	(20,000)
Refined do.	About 25 companies, of which the largest are:	20 refineries, including:	2,062,000
Do. do.	Deutsche Shell AG	Refineries at Godorf, Hamburg, and Grasbrook	(256,000)
Do. do.	Esso AG	Refineries at Karlsruhe and Ingolstadt	(245,000)
Do. do.	Ruhr Oel AG	Refinery at Gelsenkirchen	(215,500)
Do. do.	Erdoel Raffinerie Neustadt GmbH	Refinery at Neustadt-Donau	(145,000)
Potash, K_2O content	Kali und Salz AG	Mines at Bergmannssegen-Hugo, Niedersachen-Riedel, Salzdetfurth, Sigmundshall, Hattorf, Neuhof-Ellers, and Wintershall	3,500
Do.	MDK (Mitteldeutsche Kali und Sondershausen)	10 mines mostly in the State of Thüringen	2,500
Salt (rock)	Kali und Salz AG	Mines at Bad Friedrichshall-Kochendorf, Braunschweig-Luneburg, Heilbronn, Riedel, Sletten, and Wesel (Borth)	15,000
Steel	Major companies, including:	About 25 plants, including:	
Do.	Thyssen Krupp Stahl AG	Plants mostly in the Westphalia Region	21,000
Do.	Salzgitter AG	Plants at Peine and Salzgitter	9,000
Do.	Klöckner-Werke AG	Plants at Bremen and Osnabruck	4,200
Zinc	Ruhr-Zink GmbH (Metallgesellschaft AG, 100%)	Refinery at Datteln	200
Do.	Berzelius Metallhütten GmbH	Imperial smelter and fire refinery at Duisburg	100
Do.	Metaleurop Weser Zink GmbH	Refinery at Nordenham	130

THE MINERAL INDUSTRY OF

GREECE

By Harold R. Newman

The mineral industry, consisting of the mining sector, the industrial minerals sector, and the metal processing sector, was a small but important part of the national economy. In 2000, about 60% of the mineral industry's production was handled by five mining companies. In terms of production, bauxite was the most important of Greek mineral commodities. Other important commodities were chromite, nickel, and zinc. Aluminum was produced from domestic sources of bauxite and alumina and was important in the domestically integrated metals' sector. The steel produced was mostly from imported scrap. Greece was the largest producer of bauxite, magnesium, nickel, and perlite in the European Union (EU) (table 1).

The industrial mineral sector was more important, in terms of value of production, in the national economy than was the metal sector. Production of mineral commodities in Greece was closely tied to the export market. Exports of minerals, such as bauxite, bentonite, nickel, and perlite, made up a major share of total revenues. About 50% of the country's mineral production was being exported. A relatively small industrial base, lack of adequate investment in the past, and the distance from the EU market have restricted the export potential of the country. The emerging Balkan markets, however, could offer opportunities for export growth. Greece is the only Balkan country that is member of the EU (U.S. Department of State, 2002, p. 9).

Because northern Greece was thought to contain a significant amount of exploitable mineral resources, it received the most attention in exploration activities. In 2001, most activities were directed toward gold. Only a few foreign companies had invested in Greek mines. Of these, TVX Hellas S.A. (an affiliate of TVX Gold Inc. of Canada) bought the Kassandra Mines assets; United Kingdom-based Microfine S.A. operated mines that extracted hundite/hydromagnesite, which is unique for its flame-retardant properties; and German-based Otavi Minen Hellas S.A. operated perlite mines. Selected companies with major equity owners are listed in table 2.

Environmental concerns are the responsibility of the Ministry of Environment, Town Planning, and Public Works. The Government takes an active role in environmental protection. The general laws enacted by the Government include law 1360/76 (Siting Arrangement and Environment), Presidential Executive Order 1180/81, and law 1650/86 (Environmental Protection); these formed the basis of the active legislative framework. To comply with EU Order 88/609 concerning emission limitations, the Government executed Ministry Decision 58751/2370/15.4.93, which included the limits of the main pollutants from electric powerplants.

The only producer of primary aluminum in Greece Aluminium de Grèce S.A. (subsidiary of Pechiney of France) was concerned about the availability of a stable energy supply. Owing to increased electricity demand, the country's energy resources were under strain, particularly during the summer months. The 162,000-metric-ton-per-year (t/yr) St. Nicolas smelter near Delphi required 230 kilowatthours of electricity. The smelter produces aluminum ingots, T-bars, billets, and slabs. When the power agreement that guaranteed Aluminium de Grèce uninterrupted power supply expires in 2006, the problem may become more acute. The company was considering options that included building its own thermal powerplant (Lauchlan, 2001).

Bauxite mining and processing continued into 2001. Delphi-Distomon S.A. (Aluminium de Grèce's bauxite mining subsidiary) produced about 1 million metric tons per year (Mt/yr). Although the bauxite ore has an average alumina content of 53%, it also has a high silica content which makes it hard to process. The company maintained its refinery's production of 750,000 t/yr by mixing the local ore with other bauxite. The St. Nicolas smelter used 350,000 t/yr of the alumina produced, and the rest was exported to Europe (Lauchlan, 2001).

Silver & Baryte Ores Mining Co. S.A.'s (S&B) operations (formerly owned by Bauxites Parnasse Mining Co. S.A.) continued in the Itea area with most of the production exported. S&B's bauxite deposits are of karst/Mediterranean type and consist of three bauxite horizons. The upper diaspore horizon and the middle boehmite horizon were mined by open pit and underground methods. Run-of-mine bauxite was transported 30 kilometers (km) to the plant where it was crushed, screened, sorted, and blended to meet the specific needs of customers. Delphi-Distomon continued to produce bauxite, which was sold to Aluminium de Grèce's operation at Distomon (Industrial Minerals, 2001c).

Eleusis Bauxite Mines, S.A. (Elbaumin) produced bauxite from two mines in Lamia; however, Elbaumin's assets were sold to private interests. Whether they would continue with bauxite production was unclear (Industrial Minerals, 2001b).

The Kassandra Mines assets, which included the Stratoni mines and mill, Olympias Mine and mill, and Skouries deposit, were owned by Hellenic Chemical Products and Fertilizer Co. and have produced arsenopyrite-gold, lead, silver, and zinc concentrates for more than 30 years. The assets were bought by TVX Hellas in 1996 to exploit the refractory gold ores in the arsenopyrite stockpiles and the surface tailings by incorporating pressure oxidation technology into the ore-processing phase at a recovery plant to be built at the Olympias site.

In 2001, Stratoni produced about 80% more metals, 54,000 kilograms (kg) of silver, 30,600 metric tons (t) of zinc, and 28,700 t of lead, than in 2000. At this rate of production, estimated reserves were considered to be sufficient for 4 years. Skouries, which is a porphyry deposit with an estimated 130 million metric tons (Mt) of ore at a grade of 0.9 gram per metric ton (g/t) of gold and 0.6% copper, was to be developed later. No permits for Skouries had been obtained at yearend (McDougal, 2001).

Greenwich Resources plc of the United Kingdom intended to increase its interest in the Sappes gold project to 100%. Sappes was owned by Danae Resources NL of Australia (51%) and Greenwich (49%). Initial planning involved a plant that could treat 290,000 t/yr of ore during a minimum life of 5 years. Estimated proven and probable reserves total 1.3 Mt at an average grade of 16.3 g/t. Owing to Government and local environmental concerns, cyanide extraction will not be used in the metallurgical process; consequently, the anticipated recovery rate would be 81% compared with the 94% that would be expected by using a cyanide process. A large amount of free gold in the ore body can be recovered by gravity methods (Mining Journal, 2001).

General Mining & Metallurgical Co. S.A. (Larco) completed a major investment in its ferronickel capacity. The company had its smelting operations and some of its mining activities near the small town of Larymna on the Gulf of Evvia and, from this site, derived its more familiar name—Larco. Three of its five electric furnaces have been upgraded, and capacity should rise from 18,000 t/yr to 22,000 t/yr of contained nickel by 2002; this would correspond to about 80,000 t/yr to 100,000 t/yr of nickel ferroalloy. Larco has three main nickel mining areas— Agios Ioannis (underground), Evvia (open pit), and Kastoria (open pit)—and processes about 2 Mt/yr of ore and another 0.5 Mt/yr of consumables, such as lignite and coal. The ore is a lateritic type of deposit and is part of a belt of mineralization that extends from Turkey to Albania. The ore grade ranges from 1.0% to 1.5% nickel. Around 80% to 85% of the ore is mined from open pit operations. The few remaining underground mines were expected to close in about 3 years. Reserves have been estimated to last 40 years (Karpel, 2001).

As part of a $75 million modernization that began in 1998, Sidenor S.A. (which is not related to the Spanish minimill of the same name) was close to full production at its Volos plant in Thessaloniki. Narrow strip production was underway, and other parts of the project were continuing. Upgrades were made to a 600,000-t/yr-capacity melt shop that was commissioned in 2001. A wide range of products was available from the 500,000-t/yr-capacity four-strand billet caster rolling mill; the mix can be adjusted according to market requirements. Greek construction is dominated by reinforced concrete, and Sidenor maintained a 33% share of the domestic rebar market in 2000. Sidenor claimed that its reinforcing steel had superior ductility as an antiseismic feature. This was an important consideration because of the seismic activity in the region (Metal Bulletin Monthly, 2001b).

Greece has limited natural gas and petroleum resources, but its Mediterranean location makes it conveniently close to several important producing regions, such as the Caspian area, the Middle East, and North Africa. Corinth Pipeworks (CPW) was initially established to produce spiral-welded pipe for water transport; the oil and gas sector, however, has become its prime focus.

CPW's plant at Corinth has two spiral submerged arc weld (SAW) lines with a capacity of 55,000 t/yr to produce pipe from 559 to 2,032 millimeters (mm) in diameter and wall thickness of 4.8 to 14 mm in lengths of up to 12 meters (m). A longitudinal electric resistance welding (ERW) line with a 190,000-t/yr capacity can produce pipe from 114.3 to 533.4 mm in diameter and from 4 to 12.7 mm in wall thickness in lengths up to 16 m (Metal Bulletin Monthly, 2001a).

CPW expected increased demand for line pipe because it is the best and safest way of transporting oil and gas. Starting in 1998, the company undertook a $120 million 3-year investment program to set up two new state-of-the-art pipe mills, a 380,000-t/yr longitudinal ERW line and a 300,000-t/yr SAW line at Thisvi. The ERW line can produce line pipe and casing from 219 to 609.6 mm in diameter, 4 to 20 mm in thickness, and lengths of up to 18 m. The SAW line produces pipe from 610 to 2,540 mm in diameter, from 6 to 25 mm in thickness, and in lengths of up to 18 m (Metal Bulletin Monthly, 2001a).

In the industrial minerals sector, Hellenic Mineral Mining Co. S.A. continued asbestos mining operations at the mines at Zidani near Kozani. Most of the various grades of asbestos fibers produced were exported. The fibers are suitable for mixed applications, such as asbestos cement pipes and roofing applications.

Greece was the second largest world producer of bentonite after the United States (Virta, 2002). Bentonite is extracted from Milos Island by open pit mining. Mykobar Mining Co. S.A. and S&B were the major producers and accounted for almost all Greek bentonite production. Mykobar's facility had the capacity to produce about 300,000 t/yr, and S&B's facility, 600,000 t/yr. Bentonite's major applications were cat litter, civil engineering applications, drilling mud, foundry applications, and iron ore pelletizing.

Lava Mining & Quarrying Co. S.A. specialized in industrial minerals—gypsum from the island of Crete, pozzolan from Milos, and pumice from the island of Yali.

Huntite/hydromagnesite is a magnesium-containing compound that is a source for mineral flame retardants. The commercially used deposits are located in northern Greece where the Kozani basin holds several million metric tons of reserves. The deposits normally consist of physical blends of the two minerals huntite and hydromagnesite in varying ratios. The levels of impurities are very low. Huntite is not as effective a fire retardant as hydromagnesite, although it is very efficient in non-fire-retardant applications, such as replacement and extender of titanium dioxide or rheology modifier in plastisols and sealants (Industrial Minerals, 2001d).

Grecian Magnesite S.A. was a leading magnesite producer in the western world. Its open pit mine was at Yerakini in northern Greece. After mining, the material was processed, beneficiated, and fed into rotary or shaft kilns for conversion to caustic or dead-burned magnesia. Grecian Magnesite was the world's largest producer of caustic calcined magnesia as well as a leading supplier of dead-burned magnesite, refractory masses, and raw magnesia (Industrial Minerals, 2001a).

In 2001, the Greek marble industry continued to play a leading role in the international dimension stone market as a result of marble production in almost all areas of the country, variety of uses, and many colors (ash, black, brown, green, pink, red, and multicolored). The marble industry was active in the quarrying, processing, and sale of blocks and finished products.

S&B continued production of natural zeolite in northern Greece. The operation produces five grain sizes of clinoptilolite, which has a high cation exchange capacity owing to its honeycomb crystalline structure.

Public Power Corporation (PPC) was the major producer of lignite, which was the predominant fuel in electricity generation in Greece. Lignite reserves were estimated to be 2,900 Mt (U.S. Energy Information Administration, 2001§[1]).

Most PPC lignite is produced from the Ptolemais-Amyntaion Basin with lesser amounts from the Megalopolis Basin.

Hellenic Petroleum SA (the state-controlled energy corporation) started construction of a 230-km pipeline to the refinery it acquired near Skopje, Macedonia. The $100 million pipeline, which was due to be completed in 2002, was the first big infrastructure project to get underway in the Balkans since the end of the Kosovo conflict. The pipeline would have the capacity to carry 2.5 Mt/yr of crude oil from a storage depot in Thessaloniki to the Okta refinery outside Skopje. Also, the Bulgarian, Greek, and Russian Governments were discussing the possibility of a plan to construct a pipeline between Alexandroupolis, Bulgaria, and Burgas, Russia. The 302-km pipeline would allow Russia to export crude oil through the Mediterranean Sea without transiting Turkey's Bosporus and Dardenelles Straights. Greece produced negligible amounts of natural gas and imported 80% of its requirements from Russia and 20% from Algeria (U.S. Energy Information Administration, 2001§).

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Major Source of Information

Institute of Geology and Mineral Exploration
70 Messoghion St.
11527 Athens, Greece
Ministry of Development
Directorate of Raw Materials Mineral Policy, Section A
80 Michalakopoulou St.
10192 Athens, Greece

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[1] A reference that includes a section twist (§) is found in the Internet Reference Cited section.

TABLE 1
GREECE: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/	1997	1998	1999	2000	2001 e/
METALS					
Aluminum:					
Bauxite	1,876,600	1,823,000	1,882,505	1,990,500	1,990,000
Alumina, Al_2O_3	615,700	625,000 e/	625,590	667,141	660,000
Metal:					
Primary	132,600	145,900	159,900 r/	167,507	165,000
Secondary e/	3,000	3,000	3,000	3,000	3,000
Chromite, run-of-mine e/	12,000	12,000	12,000	12,000	12,000
Iron and steel:					
Iron ore and concentrate, nickeliferous					
Fe content e/	700,000	700,000	600,000	575,000	575,000
Ni content	18,419	16,985	16,050	19,535	16,000
Metal:					
Steel, crude	1,016,000	1,109,000	951,000	1,088,000	1,000,000
Ferroalloys, ferronickel, gross weight	70,440	60,020	59,545	81,662	80,000
Ni content	17,600	15,005	12,964	17,470	17,000

See footnotes at end of table.

TABLE 1--Continued
GREECE: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity 2/	1997	1998	1999	2000	2001 e/
METALS--Continued					
Lead, mine output, Pb content	19,300 e/	18,000 e/	22,001	18,235	27,700
Manganese:					
Ore, crude: e/					
Gross weight	12,067 3/	10,000	990	10,000	10,000
Mn content	2,600	2,500	353	350	350
Concentrate:					
Gross weight e/	2,910	2,910	345	350	350
Mn content	1,440	1,440	149	150 e/	150
Nickel, metal, Ni content of ferronickel	17,610	15,005	13,462	15,920 r/	16,870 3/
Silver, mine output, Ag content kilograms	45,000 e/	45,000	45,771	37,145	36,000
Tin, metal, secondary e/	150	200	--	-- 3/	--
Zinc, mine output, Zn content by analysis	17,800 e/	29,100	19,619	16,900	20,000
INDUSTRIAL MINERALS					
Asbestos: e/					
Ore	4,038,076 3/	4,000,000	--	-- 3/	--
Processed, fibers	63,294 3/	50,000 e/	--	-- 3/	--
Barite:					
Ore, crude e/	905 3/	800	500	500	500
Concentrate	742	600 e/	367	300 e/	300
Cement, hydraulic e/ thousand tons	14,982 3/	14,757 r/	14,365 r/	15,463 r/	15,000
Clays:					
Bentonite:					
Crude	942,555	950,000 e/	1,049,657	1,150,000 e/	1,150,000
Processed	572,718	750,000 e/	186,716	200,000 e/	200,000
Kaolin: e/					
Crude	60,000 3/	60,000	64,931 3/	65,000	65,000
Processed	300	300	300	300	300
Feldspar e/	65,000	65,000	78,500 3/	95,000	95,000
Gypsum and anhydrite	662,640	600,000 e/	686,416	750,000 e/	700,000
Magnesite:					
Crude	623,050	650,000 e/	495,144	500,000 e/	500,000
Dead-burned	86,260	70,000 e/	39,965	45,000 e/	40,000
Caustic-calcined	116,775	125,000 e/	117,817	120,000 e/	120,000
Huntite, crude e/	19,422 3/	18,000	18,000	18,000	18,000
Nitrogen, N content of ammonia	82,700 e/	177,600	119,697	121,200	57,000
Perlite:					
Crude	695,917	600,000	777,898	600,000 e/	600,000
Screened	500,714	500,000	435,431	360,000 e/	360,000
Pozzolan (Santorin earth)	766,750	750,000	934,933	950,000 e/	900,000
Pumice	841,646	850,000	885,000	860,000 e/	850,000
Salt, all types e/	150,000	150,000	176,867	180,000	180,000
Silica	95,730	90,000	126,000	125,000 e/	125,000
Sodium compounds: e/					
Carbonate	750	750	750	750	750
Sulfate	6,000	5,000	5,000	5,000	5,000
Stone:					
Dolomite	90,000 e/	90,000	90,000	90,000 e/	90,000
Marble cubic meters	200,000 e/	200,000	178,199	200,000 e/	200,000
Flysch	90,000 e/	80,000	80,000	80,000 e/	80,000
Quartz, processed	7,500 e/	6,500	6,500	6,500 e/	6,500
Sulfur: e/					
S content of pyrites	10,000	9,500	9,500	9,600	9,500
Byproduct:					
Natural gas	52,000	55,000	55,000	60,000	55,000
Petroleum	7,600	7,500	7,500	8,000	7,500
Total	69,600	72,000 r/	72,000	77,600	72,000
Zeolite e/	3,000	4,000	3,000	3,000	3,000
MINERAL FUELS AND RELATED MATERIALS					
Coal:					
Lignite thousand tons	56,375	60,400	61,861	65,000 e/	60,000
Lignite briquets e/	50,000	50,000	34,000	34,000	35,000
Coke, gashouse e/	15,000	14,000	--	--	--

See footnotes at end of table.

TABLE 1--Continued
GREECE: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity 2/		1997	1998	1999	2000	2001 e/
MINERAL FUELS AND RELATED MATERIALS--Continued						
Gas:						
Manufactured, gasworks e/	million cubic meters	15	15	15	15	15
Natural	do.	43	40 e/	21	36 e/	36
Natural gas plant liquids e/	thousand 42-gallon barrels	350	350	350	350	350
Petroleum:						
Crude	do.	3,380	2,363 r/	1,200 r/ e/	2,093 r/	2,000
Refinery products:						
Liquefied petroleum gas	do.	5,000 e/	5,000 e/	6,415	8,886	9,000
Gasoline	do.	30,000 e/	30,000 e/	27,243	31,943	30,000
Naphtha	do.	4,500 e/	4,500 e/	7,480	8,806	9,000
Mineral jelly and wax	do.	15 e/	15 e/	14	28	28
Jet fuel	do.	12,000 e/	12,000 e/	15,152	16,696	17,000
Kerosene	do.	150 e/	150 e/	62	70	70
Distillate fuel oil	do.	26,000 e/	26,000 e/	36,300	42,127	42,000
Refinery gas	do.	2,000 e/	2,000 e/	2,891	3,416	3,500
Lubricants	do.	1,000 e/	1,000 e/	1,239	1,120	1,200
Residual fuel oil	do.	36,000 e/	36,000 e/	41,532	50,017	50,000
Bitumen	do.	1,500 e/	1,500 e/	2,491	3,133	3,200
Petroleum coke	do.	500 e/	500 e/	721	897	900
Other	do.	400 e/	400 e/	154	462	500
Refinery fuel and losses	do.	5,500 e/	5,500 e/	5,922	7,126	7,000
Total	do.	125,000 e/	125,000 e/	147,616 r/	174,727	173,000

e/ Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. r/ Revised. -- Zero.

1/ Table includes data available through March 2002.

2/ In addition to the commodities listed, other crude construction materials are produced, but no basis exists for estimation of production.

3/ Reported figure.

TABLE 2
GREECE: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Alumina	Aluminium de Grèce S.A. (Pechiney of France, 60%)	Distomon, Boeotia area	640
Aluminum	do.	do.	150
Asbestos	Hellenic Mineral Mining Co. S.A.	Mines at Zidani, near Kozani	100
Barite, $BaSO_4$	Silver & Baryte Ores Mining Co. S.A. (Eliopoulos-Kyriakopoulos Group)	Milos Island	1
Bauxite	do.	Mines at Fokis, plants at Fokis and Itea	2,000
Do.	Eleusis Bauxites Mines, S.A. (Elbaumin)	Mines near Drama, Itea, and Fthiotis-Fokis	300
Do.	do.	Plants in Aghia Marina, Drama, and Itea	400
Do.	Delphi-Distomon S.A.; Hellenic Bauxites of Distomon S.A. (Aluminium de Grèce S.A.)	Open cast mines at Delphi-Distomon area	500
Bentonite:			
Crude	Mediterranean Bentonite Co. S.A. (Industria Chemica Mineraria S.p.A., Italy)	Surface mines on Milos Island	20
Do.	Mykobar Mining Co. S.A. (Sliver & Baryte Ore Mining Co. S.A.)	Mines at Adamas, Milos Island	300
Do.	do.	Plants at Adamas, Milos Island	200
Do.	Silver & Baryte Ores Mining Co. S.A. (Eliopoulos-Kyriakopoulos Group)	Mines at Adamas, Milos Island	600
Processed	do.	Plant at Voudia Bay, Milos Island	400
Cement	Halkis Cement Co. S.A. (Blue Circle Industries plc, 72.65%)	Micro-Vathi plant, west-central Euboea Island	3,000
Do.	Halyps Cement S.A. (Ciments Français, France)	Paralia Aspropyrgou plant, Athens	800
Do.	Heracles General Cement Co. S.A. (Blue Circle Industries plc, 54.48%)	Plant at Milaki	1,900
Do.	do.	Plant at Volos	4,600
Do.	Titan Cement Co. S.A.	Elefsis plant, Athens area	400
Do.	do.	Kamari plant, Boeotia	2,600
Do.	do.	Patras plant, northern Peloponnesus	1,900

TABLE 2--Continued
GREECE: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Cement--Continued	Titan Cement Co. S.A.	Salonica plant, Salonica	1,650
Chromite	Financial-Mining-Industrial and Shipping Corp. (FIMISCO) (IRO)	Tsingeli Mines and plant near Volos	25
Ferroalloys, ferronickel, Ni content	General Mining & Metallurgical Co. S.A. (Larco) (IRO)	Lárimna metallurgical plant	25
Gold, Au in concentrate kilograms	TVX Hellas S.A. (TVX Gold Inc., Canada)	Kassandra Mines, Olympias	5,000
Gypsum	Lava Mining & Quarrying Co. S.A.	Altsi, Crete Island	500
Do.	Titan Cement Co. S.A.	do.	280
Hunite/hydromagnesite	Microfine S.A.	Mines in Kozani Basin	100
Lead, mine, Pb in concentrate	TVX Hellas S.A. (TVX Gold Inc., Canada)	Kassandra Mines (Olympias, Stratoni), northeastern Chalkidiki	30
Lignite	Public Power Corporation (Goverment)	Aliveri Mine, Euboea Island	420
Do.	do.	Megalopolis Mine, central Peloponnesus	7,000
Do.	do.	Ptolemais Mine, near Kozani	28,000
Magnesite, concentrate	Viomagn-Fimisco Ltd. (Violignit S.A., 65%; Alpha Ventures, 35%)	Mines at Gerorema, Kakavos, and Mantoudhi, northern Euboea Island	250
Do.	Grecian Magnesite S.A.	Mine and plant at Yerakini, Chalkidiki	200
Manganese, (battery-grade MnO_2)	Eleusis Bauxite Mines Mining, Industrial and Shipping S.A. [Nation Bank of Greece (OAE)]	Nevrokopi, Drama	10
Natural gas million cubic meters per day	Public Petroleum Corporation (Government)	Prinos offshore gasfield and oilfield, east of Thasos Island	125
Nickel, ore	General Mining & Metallurgical Co. S.A. (Larco) (IRO)	Agios Ioannis Mines near Larymna	500
Do	do.	Mines at Euboea Island	2,500
Nitrogen, N content of ammonia	Phosphoric Fertilizers S.A.	Nea Karvall	150
Perlite	Silver & Baryte Ores Mining Co. S.A. (Eliopoulos-Kyriakopoulos Group)	Mines on Kos and Milos Islands Plant at Pireaus	300
Do.	Otavi Minen Hellas S.A. (Otavi Minen AG, Germany)	Milos Island	150
Do.	Bouras Co.	Kos Island	50
Petroleum, refined 42-gallon barrels per day	Hellenic Aspropyrgos Refinery S.A.	Aspropyrgos	95,000
Do. do.	Motor Oil (Hellas) Corinth Refineries S.A.	Aghii Theodori, Corinth	140,000
Do. do.	Petrola Hellas S.A.	Eleusis	100,000
Do. do.	Thessaloniki Refining Co. A.E.	Thessaloniki	76,000
Pozzolan (Santorin earth)	Lava Mining & Quarrying Co. S.A. (Heracles General Cement Co. S.A.)	Xylokeratia, Milos Island	600
Do.	Titan Cement Co. S.A.	Do.	300
Pumice	Lava Mining & Quarrying Co. S.A. (Heracles General Cement Co. S.A.)	Yali Island	100
Quartz	do.	Adamas, Milos Island	150
Steel, crude	Halyvourgia Thessalias S.A. (Manessis Bros. and Voyatzis S.A., 65%; National Investment Bank for Industrial Development, 35%)	Steelworks at Volos	1,500
Do.	Halyvourgiki, Inc.	Steelworks at Eleusis	1,200
Do.	Hellenic Steel Co.	Steelworks at Thessaloniki	1000
Do.	Corinth Pipeworks	Steelworks at Thisvi	680
Do.	Sidenor S.A. (also known as Halivourgia Voriou Ellados S.A.)	Steelworks at Volos	600
Do.	do.	Stellworks at Corinth	245
Zeolite	Silver & Baryte Mining Co. S.A. (Eliopoulos-Kyriakopoulos Group)	Mine at Pendalofos, plant at Ritsona	100
Zinc, mine, Zn in concentrate	TVX Hellas S.A. (TVX Gold Inc., Canada)	Kassandra Mines (Olympias and Stratoni), northeastern Chalkidiki	30

THE MINERAL INDUSTRY OF

ICELAND

By Chin S. Kuo

Iceland's economy continued to slow down with a forecast gross domestic product growth of only 2% from that of 2000. Inflation in terms of change in consumer price index was 4.3% for 2001. The country has few demonstrated mineral resources, although deposits of diatomite were mined. Iceland continued to exploit its abundant resources of renewable energy. Virtually all of its electricity and heating came from hydroelectric power and the geothermal water reserves. With no fossil fuel resources of its own, the country relied on imported oil.

Norsk Hydro ASA of Norway postponed a decision to construct a new aluminum smelter in Reydarfjordur, Iceland, until February 2002. If the company and its partners in the project make a positive decision, the first phase of construction of the smelter would start in September with an output of between 240,000 metric tons per year (t/yr) and 280,000 t/yr beginning in 2003. A decision would be made during the second phase whether or not to increase production to between 360,000 t/yr and 420,000 t/yr (Mining Journal, 2001). The partners included Reydaral (jointly owned by Norsk Hydro and Haefi of Iceland) as builder and operator, Landsvirkjun (Icelandic national power company), and a group of Icelandic investors. Landsvirkjun was to build and operate the associated powerplant that would supply electricity to the smelter. The project was expected to cost around $1 billion and to use Norsk Hydro's smelting technology (Metal Bulletin, 2001).

Celite Corp. of the United States sold its interest worth $1.5 million in a diatomaceous earth plant in northeastern Iceland, which used natural hot steam to process diatomite ore from Lake Myvatn. The buyer was Allied EFA of the United States, which was 60% owned by Allied Resource Corp. of the United States and 40% by EFA Holding Co. of Iceland. Allied EFA planned to upgrade the plant with technology that would allow production of higher value-added products such as processed diatomite powders for specific industrial applications. A decision of the Ministry of Environment to grant a permit for dredging in a new area of the lake prevented the mining operation from being shut down. The Government studies determined the additional mining would not damage the environmentally sensitive lake (U.S. Embassy, Reykjavik, Iceland, 2001).

The Ministry of Industry issued its first approval of seismic operations in waters off Iceland. InSeis of Norway, a geophysical contractor, started surveys of southern Jan Mayen ridge using the *Polar Princess* research vessel. The area is between Greenland and Norway, northwest of the Faroe Islands (Oil & Gas Journal, 2001).

The Burfell hydroelectric project was the largest powerplant in the country with a capacity of 240 megawatts (MW). The other major hydroelectric powerplants were at Hrauneyjarfoss (210 MW) and at Sigalda (150 MW). Iceland was exploring the feasibility of exporting hydroelectric energy via submarine cable to mainland Europe and also actively sought to expand its power-intensive industries including aluminum and ferrosilicon (U.S. Department of State, 2002).

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TABLE 1
ICELAND: ESTIMATED PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1997	1998	1999	2000	2001
Aluminum metal, primary 2/		122,900 3/	173,400 3/	219,509 3/	224,439 3/	242,600 3/
Cement, hydraulic 4/		101,000	117,684 3/	131,292 3/	143,734 3/	155,000
Diatomite		26,000	26,000	28,299 3/	27,614 3/	28,000
Ferrosilicon		70,000	68,000	70,933 3/	70,000	70,000
Nitrogen, N content of ammonia		7,400	5,900	6,500	6,500	3,300 3/
Pumice and related volcanic material:						
Pumice		25,000	25,000	25,000	25,000	25,000
Scoria		500	500	500	500	500
Salt		4,000	4,000	4,000	4,000	4,500
Sand:						
Basaltic	cubic meters	1,200	1,000	1,000	1,000	1,100
Calcareous, shell	do.	82,000	80,000	80,000	80,000	80,000
Sand and gravel	thousand cubic meters	3,600	3,600	3,600	4,000	4,000
Silica dust 5/		14,000	12,000	11,628 3/	12,000	12,000
Stone, crushed:						
Basaltic		90,000	90,000	90,000	95,000	95,000
Rhyolite	cubic meters	16,500	16,500	16,500	17,000	17,000

1/ Table includes data available through May 21, 2002.

2/ Ingot and rolling billet production.

3/ Reported figure.

4/ Sales.

5/ Byproduct of ferrosilicon.

THE MINERAL INDUSTRY OF

IRELAND

By Harold R. Newman

Ireland remained a major European Union (EU) producer of zinc and an important producer of alumina, lead, and peat in 2001. Although the range of minerals exploited in the country has been limited, exploration activity for additional new mineral resources, mainly emphasizing gold, lead, and zinc, continued to increase. The country's mineral-processing industry was small as was the demand for and consumption of mineral products (table 1).

Interest in gold, lead, and zinc exploration has provided the impetus for the revitalization of the exploration sector within the past few years. The upswing in activity in the lead and zinc sector has resulted in the development of new mines and the investigation of several other potential projects. See table 2 for the structure of the mineral industry in 2001.

In 2001, the Irish economy continued to grow strongly, albeit at a slower rate than previous years. Ireland had 10 years of economic growth with gross domestic product growth that averaged more than 8%. The unemployment rate was reduced from about 14% to less than 4%. On January 1, 1999, the Irish pound (I£) ceased to exist as Ireland's national currency, and the new EU euro (€) became the official unit of exchange; Irish currency will, however, continue to circulate until the introduction of € notes and coins in January 2002 (U.S. Bureau of Economic and Business Affairs, 2002).

In midyear 2001, Irish Ispat Ltd. (a subsidiary of Ispat International N.V.) announced the closing of its steel plant at Haulbowline, County Cork, after failing to find a buyer. Ispat acquired the plant (formerly known as Irish Steel) from the Irish Government in 1996. During this period, Irish Ispat had to operate under difficult steel market conditions, a competitive EU market for its products, rising energy costs, and a 40% average rise in the plant's wage bill. The company reported losses of more than $600,000 per month. Irish Ispat produced medium steel sections, mostly for export to the United Kingdom and continental Europe (Metal Bulletin, 2001a).

Strongbow Resources Inc. completed a drilling program at the Avoca project in County Wicklow. The project, which is located 60 kilometers (km) south of Dublin, consisted of a number of zinc-lead-silver-rich volcanogenic massive sulfide (VMS) targets within volcanic rocks of Ordovician age. Seven holes, which totaled 1,195 meters (m), were drilled, and the company reported significant results in four of the holes. Strongbow had licences that covered 73 square kilometers (km^2) and considered the area to have great potential as a VMS system (Strongbow Resources Inc., June 2001§[1]).

Ireland was a major EU zinc producer with production centered on Anglo American plc's and Ivernia West plc's joint venture Lisheen zinc-lead mine, Arcon International Resources plc's Galmoy zinc-lead mine, and Outokumpu Oyj's Tara zinc-lead mine (table 2). These were three of Europe's most modern mines.

Outokumpu announced that it was closing the Tara Mine at Navan and would quit base-metal mining and focus on metal production, fabrication, and technology. The Tara Mine would be put on care and maintenance, although production could be resumed if zinc prices improve. Tara, which was the largest zinc mine in Europe, has been producing about 200,000 metric tons per year (t/yr) of zinc-in-concentrate and has been supplying from 10% to15% of the raw material for Outokumpu's Kokkola and Odda zinc plants. Outokumpu was the third largest zinc metal producer in Europe with a 15% share of the European market and a 5% share of the world zinc production. The company has been significantly affected by the decline in zinc prices (Metal Bulletin, 2001b).

The Galmoy Mine, which is located 110 km southwest of Dublin, was producing 650,000 t/yr of ore at target grades of 11.3% zinc and 1% lead. Most of the current (2001) reserves were contained in three major ore bodies; the 4-million-metric-ton (Mt) CW ore body was being mined. The ore body was mined underground by using the room-and-pillar method. All the ore was crushed underground and transported to the surface by means of a conveyor belt. Total estimated reserves and resources were more than 10 Mt at a grade of 11.4% zinc and 1.1% lead. Other ore bodies are to the west of CW, and the development of a decline to the G, K, and associated ore bodies was begun. The deepest ore is 100 m below the surface (Chadwick, 2001).

The most recent zinc mine, the Lisheen Mine, is located within a few kilometers of the Galmoy Mine, on the Rathdowney Trend mineralized belt. The first ore was mined in 1999. Officially, Lisheen began commercial production on January 1, 2001. The two ore bodies—Main Zone and Derryville—were initially planned to produce 160,000 t/yr of zinc in concentrate but should be increased to 330,000 t/yr of zinc and 40,000 t/yr of lead in concentrates at full production. The deposit is about 30 m thick with depths up to 300 m. Estimated proven and probable reserves were 15.4 Mt at a grade of 11.76% zinc and 2.05% lead (Robertson, 2001).

Industrial mineral production remained relatively constant. Several industrial minerals projects were awaiting to be granted planning permissions and mining leases before moving into development and production.

Cambridge Mineral Resources plc was continuing with diamond and sapphire exploration work. Operations on the gemstone prospect in Inishow, County Donegal, have included stream sediment sampling, ground magnetic surveys, and airborne magnetics over Cambridge's six prospecting licenses, which cover an area of about 250 km^2. Numerous diamond indicator minerals, which include peridotitic and eclogitic garnets and clinopyroxenes, were identified. Ruby and sapphire were also recovered in significant quantities from certain locations, thus widening the project focus (Cambridge Mineral Resources plc, 2001§).

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[1] References that include a section twist (§) are found in the Internet References Cited section.

Natural gas production continued off the southern coast of Ireland near Cork. Reserves were not disclosed, and the production from the fields was being carefully managed to extend the life of the fields.

Enterprise Oil plc announced it had approved the $580 million development of the Corrib natural gas field, which is located 80 km west of Erris Head, County Mayo. This would be the first offshore development in Ireland in two decades. The decision was welcome news for Ireland, which is facing a shortfall of natural gas in the next few years as demand rises and the existing offshore field, Kinsale, nears the end of its productive life. The first gas would flow by 2003 and be carried onshore through a subsea pipeline and then processed at a terminal in Mayo (Alexander's Gas and Oil Connections, 2001§).

The Geological Survey of Ireland (GSI) was responsible for the development of minerals information and for the technical management of the state mineral licensing and leasing system. Ireland's geology includes several lithological units and tectonic features that are favorable for the occurrence of several types of mineral resources from base metals to industrial minerals. The GSI provided technical assistance to the exploration and mining industry in defining these occurrences.

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Beggars Bush, Paddington Rd.
Dublin 4, Ireland
Geological Survey of Ireland
Beggars Bush, Paddington Rd.
Dublin 4, Ireland

TABLE 1
IRELAND: PRODUCTION OF MINERAL COMMODITIES 1/

(Thousand metric tons unless otherwise specified)

Commodity		1997	1998	1999	2000	2001 e/
METALS						
Alumina e/		1,273 2/	1,200	1,200	1,200	1,200
Iron and steel, steel, crude		337	358	335	360	150
Lead:						
Mine output, Pb content	tons	45,149	36,528	43,831	57,825 r/	44,500 2/
Metal, refined, secondary e/	do.	12,000	12,000	12,996 2/	9,000 2/	13,000 2/
Silver, mine output, Ag content	kilograms	13,284	10,800	15,300	25,100 r/	22,600 2/
Zinc, mine output, Zn content	tons	194,796	180,951 r/	226,100	262,877 r/	225,135 2/
INDUSTRIAL MINERALS 3/						
Cement, hydraulic		2,100 e/	2,256 r/	2,466 r/	2,620 r/	2,500
Gypsum e/		477 2/	450	450	450	500
Lime e/		100,000	100,000	100,000	100,000	100,000
Nitrogen, N content of ammonia		465	458	401	410	443 2/
Sand and gravel e/ 4/		12,000	12,000	12,000	12,000	12,000
Stone and other quarry products: e/						
Limestone	million tons	1	1	1	1	1
Other 5/	tons	35,000	36,000	35,000	35,000	36,000

See footnotes at end of table.

TABLE 1--Continued
IRELAND: PRODUCTION OF MINERAL COMMODITIES 1/

(Thousand metric tons unless otherwise specified)

Commodity		1997	1998	1999	2000	2001 e/
MINERAL FUELS AND RELATED MATERIALS						
Gas, natural, marketed	million cubic meters	2,417	2,400	2,500 e/	2,500 e/	2,500
Peat:						
For horticultural use e/		400	400	350	400	400
For fuel use: e/						
Sod peat 6/		1,000	1,000	1,600	1,600	1,600
Milled peat 7/		2,851 2/	3,000	4,000	3,500	3,500
Total		3,900 r/	4,000	5,600	5,100	5,100
Peat briquets e/		253	300	300	300	300
Petroleum refinery products: 8/						
Liquefied petroleum gas	thousand 42-gallon barrels	350 e/	498	464 r/	545 r/	500
Naphtha	do.	350 e/	799	1,046 r/	884 r/	900
Gasoline, motor	do.	3,000 e/	3,868	3,893 r/	4,556 r/	4,500
Distillate fuel oil	do.	5,000 e/	7,443	7,333 r/	8,415 r/	8,000
Residual fuel oil	do.	5,000 e/	6,693	7,000 r/	7,639 r/	7,000
Refinery fuel and losses	do.	400 e/	147	70 r/	77 r/	75
Total	do.	14,100 e/	19,448	19,806 r/	22,116 r/	21,000

e/ Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. r/ Revised.

1/ Table includes data available through March 2002.

2/ Reported figure.

3/ Ireland also produces significant quantities of synthetic diamond and is the major supplier to the United States. Output, however, is not quantitatively reported, and general information is inadequate to make reliable estimates of output levels.

4/ Excludes output by local authorities and road contractors.

5/ Includes clays for cement production, fire clay, granite, marble, rock sand, silica rock, and slate.

6/ Includes production by farmers and by Bord Na Mona (Government Peat Board).

7/ Includes milled peat used for briquet production.

8/ From imported crude oil.

TABLE 2
IRELAND: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facility	Annual capacity
Alumina		Glencore International AG	Aughinish Island, County Limerick	1,000
Barite		Magobar Ireland Ltd.	Silvermines, County Tipperary	240
Cement		Irish Cement Ltd.	Plants in Limerick and Platin	2,000
Lead-zinc, concentrate		Anglo American plc, 50%; Ivernia West plc, 50%	Lisheen Mine, County Kilkenny	160
Do.		Arcon International Resources plc	Galmoy Mine, County Kilkenny	135
Do.		Outokumpu Oyj	Tara Mine, Navan, County Meath	215
Natural gas	million cubic feet	Marathon Oil Co.	Kinsale Head Field, Celtic Sea	75,000
Nitrogen, N content of ammonia		Irish Fertilizer Industries	Plant at Marino Point	450
Peat		Bord Na Mona (Government Peat Board)	Production mainly in midlands	4,200
Petroleum, refined	barrels per day	Irish National Petroleum Corp. Ltd. (Tosco Corp., 100%)	Whitegate, near Cork	75,000
Steel		Irish Ispat Ltd. (Ispat International N.V.)	Haulbowline, near Cork (closed)	500

THE MINERAL INDUSTRY OF

ITALY

By Harold R. Newman

Italy has been a significant processor of imported raw materials as well as a significant consumer and exporter of mineral and semimanufactured and finished metal products. Italy, which was one of the world's largest producers of pumice and feldspar, produced almost one-half of the world's output of pumice and about one-fourth of the world's output of feldspar. In terms of world production, the country was a significant producer of cement and crude steel. Italy was also an important producer of dimension stone and marble.

Italy was one of the 11 founding members of the European Economic and Monetary Union (EMU) and was the world's sixth largest economy in 2001. The Government has traditionally played a dominant role in the economy through regulation of and through ownership of large industrial and financial companies. Privatization and regulatory reform since 1994 have reduced that presence. The Government, however, has retained a potentially blocking "golden share" in all the industrial companies that had been privatized thus far (U.S. Department of State, 2002, p. 6).

Among the metallic ores, gold, lead, silver, and zinc were mined. Except for gold, the outputs of these ores were not significant.

Industrial mineral production, which included construction materials, was the most important sector with overall output remaining about the same as that of 2000. Domestic production of natural gas and petroleum continued as in 2000 (table 1).

Private and public companies own facilities for the mining and processing of minerals and mineral products. Some enterprises were under State control for such economic reasons as to maintain employment (table 2).

Commodity Analysis

Metals

Alumina.—In 2001, Eurallumina S.p.A. operated close to its capacity of 1 million metric tons per year (Mt/yr) at its alumina refinery. The plant produced alumina and hydrate for the account of the joint-venture participants who take the product in proportion to their shares in the consortium. Comalco Ltd. owned 56.2% and Glencore AG owned 43.8% of the operation. Eurallumina sourced 90% of its bauxite requirements from Comalco's Weipa Mine in Australia and 10% from Comalco's Boké Mine in Guinea. Eventually, bauxite supplied by Boké will be phased out, and Weipa will furnish all Eurallumina's bauxite requirements (Eurallumina S.p.A., 2001§[1]).

Copper.—The largest producer of refined copper in Italy Enirisorse S.p.A. accounted for about one-half of Italy's copper output. Italy's refined copper production has dropped significantly since 1998 owing to the decreased availability and increased cost of scrap material. Copper mines in Italy are not significant, and imports of ore were small.

Gold.—Gold Mines of Sardinia Ltd. (GMS), which was a joint venture of Gold Mines of Sardinia Ltd. (70%) and Progemisa S.p.A. (30%), operated the Furtei Mine, which is located north of Cagliari. Furtei was the first gold mine of GMS and the first gold mine in Italy. GMS reported that the latest drilling results from the Monte Ollasteddu project in eastern Sardinia have confirmed that it will be a most promising gold discovery. Mineralization has been traced along strike for 3.5 kilometers (km) and over widths of up to 1 km. Average grades were around 2.5 grams per metric ton gold. GMS also reported zones that have multiple gold-bearing seams possessing higher gold content (Mining Journal, 2001).

Lead and Zinc.—Italy imported most of its requirements for lead and zinc concentrates. Within Italy, the small amount of lead and zinc concentrate production came from mines in Sardinia.

Steel.—Riva S.p.A. dismantled its coke plant at the Cornigliano works in compliance with a court order. Riva agreed that the coke ovens did not comply with environmental regulations. The company was involved in applications to build new electric ark furnaces with 2.4 million metric tons of capacity to replace its blast furnaces. About 60% of Italian steel was produced by electric-arc furnaces, and about 40% was produced by basic oxygen furnaces (Metal Bulletin Monthly, 2001).

Ilva Laminati Piani S.p.A. (Ilva), which was Italy's largest steelmaker and a part of the Riva Group, announced that it had increased its cold-rolling capacity at the Taranto plant to 1.5 Mt/yr from 1.3 Mt/yr, although the production level was about 800,000 metric tons per year (t/yr). In addition, a new 450,000-t/yr galvanizing line became operational in 2001. The upgrades, which included a new coke oven battery, were part of an investment program to enable Ilva to produce 10 Mt/yr by 2002 (Metal Bulletin, 2001).

Acciaierie e Ferriere Vicentine Beltrame S.p.A. (AFV-Beltrame) was to buy two steelworks from Siderugica Ferrero S.p.A. in 2002. The San Didero minimill, which is near Turin, had a capacity of about 1 Mt/yr; the San Giovanni Valdarno light section mill, which is near Florence, had a capacity of about 230,000 t/yr. The plants' products included, in decreasing order, reinforcing bars, flats, angles, squares, tees, and sections up to 140 millimeters. The acquisitions would raise AFV-Beltrame's production capacity to more than 2.5 Mt/yr (Metal Bulletin, 2002).

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[1] References that include a section twist (§) are found in the Internet References Cited section.

Industrial Minerals

Bauxite.—Italy's only bauxite producer Sardabauxiti S.p.A. mined the Olmedo karst bauxite deposit, which is largely boehmitic and contains less than 5% diaspore. The company was estimated to produce 300,000 t/yr of abrasive, cement, and slag adjuster grades of bauxite (Industrial Minerals, 2001).

Cement.—Italy was the second largest cement producer of the European Union (EU), after Germany. Italcementi Fabbriche Riunite Cemento S.p.A. was the largest of Italy's cement producers with 22 plants and 55 quarries (Italcementi Group, 2001§). Italy was a net exporter of cement.

Gypsum.—A new gypsum processing plant opened in mid 2001 in Moncalvo, Province of Asti, northwestern Italy. The plant of Fassa S.r.l. was a state-of-the-art burning and processing plant for gypsum (CaSO42H2O) extracted from a nearby quarry. The plant was completely automatic, from the discharge of raw gypsum to the bagging of the finished product. Production was about 90,000 t/yr of hemihydrate gypsum. Future plans were to increase production capacity to 140,000 t/yr with the addition of a third kiln (World Cement, 2001).

Lime.—The Italian lime industry had a quicklime production of about 1.6 Mt/yr. In addition to this, the country produced more than 600,000 t/yr of hydrated lime. Most of the lime production was concentrated in the region of Lombardy. Unicalce S.p.A. was the leading player in the industry with 18 plants (Gypsum, Lime & Building Products, 2001).

Marble.—Marble occurs in many localities from the Italian Alps to Sicily and is quarried at hundreds of operations. The most important geographic area for producing white marble is in the Apuan Alps in Tuscany, particularly near the town of Carrara. Lombardy, the Po Valley, Puglia, Sicily Island, and Verona-Vincenza are important colored-marble-producing areas. About one-half of the production was in block form. Other major marble-producing areas include the Valle di Susa, which is near Turin, and Benevento, which is northeast of Naples.

Potash.—Production of potash remained suspended in 2001. The main reasons were the restricted availability of ground water owing to a severe drought and the inability to remove waste material and mine water owing to environmental and ecological concerns. In Sicily, the underground mines that had been operating at Pasquasia, Racalmuto, and Realmonte remained on care and maintenance.

Pumice and Pozzolan.—Italy was a significant producer of pumice and pozzolan (table 1). The Mediterranean Island of Lipari, which is 40 km off the northern coast of Sicily, was the center of the Italian pumice industry. Pumex S.p.A. and Sta Siciliana per l'Industria ed il Commercio della Pomice di Lipari S.p.A. (Italpomice S.p.A.) quarried pumice for world markets. Pumex, with about a 600,000 t/yr capacity, was Italy's largest pumice producer. The company quarried the Mount Pelato deposit on Lipari (Pumex S.p.a., 2002§).

Mineral Fuels

Italy was almost entirely dependent on imports to meet its energy needs. The country's heavy reliance on foreign oil and gas sources, such as Algeria and Libya, has made energy security and diversification of energy sources top concern (U.S. Energy Information Administration, 2001§).

Coal.—Italy was heavily dependent on imported coal. Most imports were from, in declining order of importance, Russia, South Africa, the United States, and China. Coal consumption in Italy is dominated by power generation, which was increasing, and coke production for steel, which was decreasing. About 6% of Italy's primary energy demand was met with coal (U.S. Energy Information Administration, 2001§). Lignite coal was produced by Ente Nazional per l'Energia Electrica's Santa Barbara Mine in Tuscany, which was the only lignite mine in Italy.

Geothermal Energy.—Geothermal energy was produced in the Larderello, the Monte Amiata, and the Travale areas in Tuscany. Exploration that used various geologic techniques and research for power stations that exploit geothermal energy have been actively pursued in these areas.

Petroleum.—Despite increasing domestic production of crude oil, Italy was less than 20% self-sufficient in energy. Italy's oilfields are in the north of the country, onshore and offshore along the Adriatic, and onshore and offshore Sicily. Production from two large fields, Villafortuna and Aquila, has declined in recent years. Italy's largest integrated oil company Ente Nazional Idrocorburi was in the process of developing a 600-million-barrel-equivalent oilfield at Val d'Agri, in the southern Apennine region. This was considered to be Europe's most promising onshore development area (U.S. Energy Information Administration, 2001§).

Outlook

Mining of metallic ores is expected to remain at its low levels because of ore depletion and will eventually cease altogether. The metals processing industry, which is based primarily on imported raw materials, is expected to continue to play an important role in Italy's economy. Italy is expected to remain a large producer of crude steel and a significant producer of secondary aluminum in the EU.

The industrial minerals quarrying industry and preparation plants are expected to remain significant, especially in the production of barite, cement, clays, fluorspar, marble, and talc. Italy is expected to continue to be the world's leading producer of feldspar, feldspathic minerals, and pumice.

Domestic outputs of natural gas, crude petroleum, and petroleum refinery products are expected to grow, although Italy will continue to depend on imported coal, gas, and petroleum for most of its needs.

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Major Sources of Information

Associazione Mineraria Italiana
Via delle Madonne, 20
00197 Rome, Italy

Ministero dell'Industria del Commercio e dell'Artigianato
Direzione Generale delle Minire
Via Molise, 2
00184 Rome, Italy

TABLE 1
ITALY: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1997	1998	1999	2,000	2001 e/
METALS						
Aluminum:						
Alumina, calcined basis e/		913,000	930,000	973,000	950,000	950,000
Metal:						
Primary		187,719	186,953	187,281	189,800	187,400 2/
Secondary		442,900	502,600	501,800	567,500	574,900 2/
Antimony, oxides, gross weight e/ 3/		800 2/	700	600	600	600
Bismuth metal e/		5	5	5	5	5
Cadmium metal, smelter		287	328	360	284	313 2/
Copper, metal, refined, all kinds e/		85,700	29,100	28,500	72,800	35,500 2/
Gold, Au content	kilograms	--	500 r/	600 r/	791 r/	503 2/
Iron and steel, metal:						
Pig iron	thousand tons	11,348	10,704	10,622	11,219	10,650 2/
Ferroalloys:						
Electric furnace:						
Ferrochromium		11,295	11,487	-- r/	-- r/	--
Ferromanganese		40,000	49,000	19,000	40,000	40,000
Ferrosilicon e/		12,000	12,000	12,000	12,000	12,000
Silicomanganese		100,000	70,000	67,000	90,000	80,000
Silicon metal		12,619	8,094	6,257	5,000	6,000
Other e/		10,000	10,000	10,000	10,000	10,000
Total e/		185,914	160,581	114,257 r/	157,000 r/	148,000
Steel, crude	thousand tons	25,537	25,826	24,964	26,445	26,483 2/
Steel, hot rolled	do.	23,146	22,648	22,918	23,858	23,059 2/
Lead:						
Mine output, Pb content		11,792	6,800	6,000 e/	2,000 e/	1,000
Metal, refined:						
Primary		65,700	57,400	66,954	75,000 e/	82,000
Secondary		145,900	141,900	148,354	160,000 e/	121,000
Total		211,600	199,300	215,308	235,000 e/	203,000
Manganese, mine output, Mn content e/		1,490	1,440	1,200	1,200	1,000
Silver metal	kilograms	4,500	2,500	4,000	4,000 e/	3,500
Zinc:						
Mine output, Zn content		8,470	2,459	--	--	--
Metal, primary		268,300	231,600	145,318	170,300 r/	177,800 2/

See footnotes at end of table.

TABLE 1--Continued
ITALY: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity	1997	1998	1999	2,000	2001 e/
INDUSTRIAL MINERALS					
Barite e/	26,300 2/	36,000	30,000	30,000	30,000
Bauxite e/	300	300	300	300	300
Bromine e/	300	300	300	300	300
Cement, hydraulic thousand tons	33,721	36,222 r/	37,391 r/	39,020 r/	39,885 2/
Clays, crude:					
Bentonite do.	513	592	600	600 e/	600
Refractory excluding kaolinitic earth e/ do.	750	750	700	700	700
Fuller's earth e/ do.	30	30	30	30	30
Kaolin e/ do.	100	100	100	100	100
Kaolinitic earth e/ do.	10	10	10	10	10
Diatomite e/	25,000	25,000	25,000	25,000	25,000
Feldspar e/ thousand tons	2,200	2,748 2/	2,700	2,500	2,500
Fluospar e/					
Acid-grade	105,800 2/	92,000	95,000	50,000	30,000
Metallurgical-grade	20,000 2/	15,000	15,000	15,000	15,000
Total	125,800 2/	107,000	110,000	65,000	45,000
Gypsum e/ thousand tons	1,300	1,300	1,300	1,200	1,200
Lime, hydrated, hydraulic and quicklime e/ do.	3,500	3,500	3,500	3,500	3,500
Nitrogen, N content of ammonia do.	445	409	367	408	434 2/
Perlite e/	60,000	60,000	60,000	60,000	60,000
Pigments, mineral, iron oxides, natural e/	500	500	500	500	500
Pumice and related materials: e/					
Pumice and pumiceous lapilli thousand tons	600	600	600	600	600
Pozzolan do.	4,000	4,000	4,000	4,000	4,000
Salt: e/					
Marine, crude 4/ do.	600	600	600	600	600
Rock and brine do.	3,500 2/	3,300	3,200	3,200	3,200
Sand and gravel: e/					
Volcanic sand thousand tons.	100	100	100	100	100
Silica sand do.	3,000	3,000	3,000	3,000	3,000
Other sand and gravel	100,000	100,000	100,000	100,000	100,000
Sodium compounds: e/					
Soda ash thousand tons	1,000	1,000	1,000	1,000	100
Sodium sulfate do.	125	125	125	125	125
Stone: e/ 5/					
Calcareous:					
Alabaster do.	25	25	25	25	25
Marble in blocks:					
White do.	100	100	100	100	100
Colored do.	3,000	3,000	3,000	3,000	3,000
Travertine do.	2,500	2,500	2,500	2,500	2,500
Other:					
Granite do.	100	100	100	100	100
Sandstone do.	1,800	1,800	1,800	1,800	1,800
Slate do.	100	100	100	100	100
Crushed and broken:					
Dolomite do.	760	711 2/	700	700	700
Limestone do.	120,000	120,000	120,000	120,000	120,000
Marl for cement do.	15,000	15,000	15,000	14,000	14,000
Serpentine do.	1,500	1,500	1,500	1,500	1,500
Quartz and quartzite do.	30	30	30	30	30
Sulfur, recovered as elemental, in compounds, byproducts, other sources e/ do.	609	624	678 2/	693 2/	743 2/
Talc and related materials e/	142,000	138,000	140,000	140,000	140,000

See footnotes at end of table.

TABLE 1--Continued
ITALY: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1997	1998	1999	2,000	2001 e/
MINERAL FUELS AND RELATED MATERIALS						
Asphalt and bituminous rock, natural e/		30,000	30,000	30,000	30,000	30,000
Coal:						
Lignite	thousand tons	203	156	19	14	10
Subbituminous, Sulcis coal e/		2,800 2/	10	5	5	5
Coke, metallurgical	thousand tons	5,214	3,500	4,825	5,264	5,200
Gas, natural e/	million cubic meters	19,500	19,000	18,500 2/	18,500	18,000
Natural gas liquids e/	thousand 42-gallon barrels	400	400	350	350	350
Petroleum:						
Crude	do.	36,720	42,923	34,245	35,000	35,000
Refinery products:						
Liquefied petroleum gas	do.	26,181	25,750	25,404	27,446	27,000
Gasoline	do.	171,615	173,264	174,063	175,576	175,000
Naphtha	do.	33,040	37,341	30,209	30,000 e/	30,000
Jet fuel e/	do.	24,000	25,000	25,000	36,440 2/	36,000
Kerosene e/	do.	35,000	30,000	30,000	15,000	15,000
Distillate fuel oil	do.	256,833	271,910	271,820	262,226	262,000
Residual fuel oil	do.	112,180	114,226	104,948	100,459	100,000
Other	do.	35,000 e/	38,850	42,042	46,137	46,000
Refinery fuel and losses	do.	1,800 e/	1,568	1,778	1,700 e/	1,700
Total e/	do.	696,000	718,000	705,000	695,000	692,700

e/ Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. r/ Revised. -- Zero.

1/ Table includes data available through May 2002.

2/ Reported figure.

3/ Antimony content is 83% of gross weight.

4/ Does not include production from Sardinia and Sicily, which was estimated to be 200,000 metric tons per year.

5/ Output of limestone and serpentine for dimension stone is included with "Stone: Crushed and broken." In addition to the commodities listed, a variety of other dimension stone was produced and previously listed, but available general information was inadequate for continued reliable estimation of output level

TABLE 2
ITALY: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Alumina	Eurallumina S.p.A. (Comalco Ltd., 56.2%; Glencore AG, 43.8%)	Plant at Portoscuso, Sardinia	1,000
Aluminum	Alcoa Italia S.p.A. (Alcoa Inc., 100%)	Smelters at Porto Vesme, Sardinia, and Fusina, near Venice	188
Asbestos	Amiantifera di Balangero S.p.A.	Mine at Balangero, near Turin	100
Barite	Bariosarda S.p.A. (Ente Mineraria Sarda)	Mines at Barega and Mont 'Ega, Sardinia	100
Do.	Edem S.p.A. (Government)	Mines at Val di Castello, Lucca	20
Do.	Edemsarda S.p.A. (Soc. Imprese Industriali)	Mines at Su Benatzu, Sto Stefano, and Peppixeddu,	20
Do.	Mineraria Baritina S.p.A.	Sardina Mines at Marigolek, Monte Elto, and Primaluna, near Milan	
Bauxite	Sardabauxiti S.p.A. (Cogein S.p.A., 40%; Comtec, 40%; Icofin Co., 20%)	Mine at Olmedo, Sardinia	350
Bentonite	Industria Chimica Carlo Laviosa S.p.A	Mines and plant on Sardinia Island, and a plant near Pisa	250
Cement	52 companies, of which the largest are:		
	Italcementi Fabbriche Riunite Cemento S.p.A.	22 plants, of which the largest are Calusco, Monselice, and Ccollefero	(15,000)
Do.	Unicem S.p.A.	12 plants, of which Guidonia, Lugagnano, Morano, Piacenza, S'Arcangelo di Romagna, and Settimello are the largest	(10,000)
Do.	Cementerie del Tirreno S.p.A. (Cementir)	6 plants at Arquasta Scivia, Livorno, Maddaloni, Napoli, Spoleto, and Taranto	(5,300)
Copper, refined	SIMAR S.p.A.	Refinery at Porto Marghera	60
Do.	Europa Metalli - LMI S.p.A.	Refinery Fornaci di Barga	24
Do.	SITI Industries	Refinery at Pieve Vergonte	22

TABLE 2--Continued
ITALY: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Feldspar	At least 5 companies, of which the largest are:		1,500
Do.	Maffei S.p.A.	Surface mines at Pinzolo, Sondalo, and Campiglia Marittima	(200)
Do.		Underground mine at Vipiteno	(300)
Do.	Miniera di Fragne S.p.A.	Surface mine at Alagna Valsesia	(60)
Do.	Sabbie Silicee Fossanova S.P.A. (Sasifo)	Surface mine at Fossanova	(30)
Gold kilograms	Gold Mines of Sardinia Ltd. 70%, Progemisa S.p.A. 30%	Furtei Mine near Cagliaria, Sardinia	1,400
Gypsum	Fassa S.r.l.	Plant at Moncalvo, Asti	90
Lead-zinc, ore	Enirisorse S.p.A. (Government)	Mines at Masua, Monteponi, and Sardinia	60
Lead, metal	do.	Refinery at San Gavino, Sardinia	80
Do.	do.	Kivcet smelter and Imperial smelter at Porto Vesme, Sardinia	114
Lignite	Ente Nazional per l'Energia Electtrica (ENEL)	Surface mine at Santa Barbara	1,000
Lime	Unicale S.p.A.	Plants in Lombardy region	500
Magnesium, metal	Societa Italiana Magnesio S.p.A. (INDEL)	Plant at Bolzano	8
Marble	A number of companies, largest of which include:	Quarries in the Carrara and Massa areas	2,000
Do.	Mineraria Marittima Srl	do.	(500)
Do.	Industria dei Marmi Vicentini S.p.A.	do.	(300)
Do.	Figaia S.p.A.	do.	(100)
Nitrogen, N content of ammonia	Hydro Agri S.p.A.	Plant at Ferrara	410
Petroleum, crude	Ente Nazional Idrocarburi (ENI) Government	Oilfields offshore Sicily, the Adriatic Sea, and onshore in the Po River Valley	90
Petroleum, refined thousand 42-gallon barresl per day	do.	About 30 refineries	2,000
Potash ore	Industria Sali Otassici e Affini per Aziono S.p.A.	Underground mines at Corvillo, Pasquasia, Racalmuto, and San Cataldo, in Sicily	1,300
Do.	Sta Italiana Sali Alcalini S.p.A. (Italkali)	Underground mines at Casteltermini and Pasquasia, Sicily	700
Pumice	Pumex S.p.A.	Quarries, Lipari Island, north of Sicily	600
Do.	Sta Siciliana per l'Industria ed il Commercio della Pomice di Lipari S.p.A. (Italpomice S.p.A.)	do.	200
Pyrite	Nuova Solmine S.p.A.	Underground mines at Campiano and Niccioleta	900
Salt, rock	Sta Italiana Sali Alcalini S.p.A. (Italkahi)	Underground mines at Petralia, Racalmuto, and Realmonte, Sicily	4,000
Do.	Solvay S.p.A.	Underground mines at Buriano, Pontteginori, and Querceto, Tuscany	2,000
Steel	Ilva Laminati Piani S.p.A. (Riva Group)	5 steel plants, the largest of which is Taranto (1,500)	4,000
Do.	Riva S.p.A.	About 5 plants	7,000
Do.	Acciaierie e Ferriere Vicentine Beltrame S.p.a. (AFV-Beltrame)	Steel plant at Vicenza	1,000
Talc	Luzenac Val Chisone S.p.A.	Mines at Pinerolo, near Turin, and at Orani, Sardinia	120
Do.	Talco Sardegna S.p.A.	Mine at Orani, Sardinia	20
Zinc, metal	Enirisorse S.p.A. (Government)	Plants at Crotone and Porto Vesme, Sardinia, and Porto Maghera, near Venice	349

THE MINERAL INDUSTRY OF

MALTA

By Harold R. Newman

Malta's mineral industry economy mainly depends on trade and the storage of crude oil and refinery products as well as other nonfuel mineral commodities. The mineral industry, which consisted mainly of limestone and salt production, contributed less than 0.5% to the gross domestic product.

Malta was an important transshipment center in the Mediterranean area. The country's natural ports and its strategic location in the middle of the shipping lanes that connect the two ends of the Mediterranean Sea are its major assets. The transshipment and reexport of goods were significant to the country's economy along with the storage of petroleum and refinery products.

With the help of foreign companies, the Maltese Government was exploring offshore areas for petroleum. Previous seismic work by the Maltese Government in the 1980s and by Texaco Corp. from 1990 to 1992 resulted in the identification of several prospects. The prospects are located along the same geologic trend as several Italian oilfields offshore Sicily.

The Australian company Hardman Resources NL was planning to drill an exploratory well offshore southeast of Malta. The Government signed an agreement allowing Pancontinental Oil and Gas plc of Australia to search for oil in waters south of Malta. The agreement provides for further geological and geophysical work, which will include the drilling of an exploratory oil well (Alexander's Oil and Gas Connections, 2001§[1]).

More extensive coverage of the mineral industry of Malta can be found in the 2000 Minerals Yearbook, volume III, Area Reports: International, Europe and Central Eurasia.

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TABLE 1
MALTA: ESTIMATED PRODUCTION OF MINERAL COMMODITIES 1/ 2/

Commodity 3/		1997	1998	1999	2000	2001
Limestone	thousand metric tons	2,000	2,000	2,000	2,000	2,000
Salt	metric tons	30	30	30	30	30

1/ Table includes data available through February 2002.

2/ Estimated data are rounded to no more than three significant digits.

3/ In addition to listed commodities, small amounts of cement, fertilizer, lime, and plaster are produced, but available information is inadequate to make reliable estimates of output levels.

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[1] A reference that includes a section twist (§) is found in the Internet Reference Cited section.

THE MINERAL INDUSTRY OF

THE NETHERLANDS

By Harold R. Newman

In 2001, the Netherlands was a very important regional producer of natural gas and petroleum for the European market and played a major role as a transshipment center for mineral materials entering and leaving continental Europe. In terms of world production, however, it was a modest producer of metallic and nonmetallic minerals and mineral products.

In the first half of 2001, the Dutch economy, which has been expanding for the past 4 years, slowed significantly and ended with a growth of only 1.75% in the gross domestic product (GDP). The modest growth was driven chiefly by increases in consumption, exports of goods and services, and investment. Dutch exports (excluding energy) grew by 2.5% in 2001. Imports to the Netherlands rose by 3.25% in 2001. Industrial products accounted for 70% of exports and were produced in a broad range of sectors. A positive-balance-of-payments situation continued to be one of the strong features of the Dutch economy (Netherlands Foreign Trade Agency, 2002§[1]).

Rotterdam, which was the world's largest container port and a major European transportation hub, and Amsterdam's Schipol Airport, which was the fourth largest in Europe, remained extremely important as shipping and storage centers. In 2001, more than one-half the Netherlands's GDP, or about $460 billion, was generated by activities outside the national borders (U.S. Department of Commerce, 2001§).

Production of mineral commodities generally remained the same or dropped slightly during 2001. The high cost of social benefits contributed to the production costs of Dutch products, thus making them less competitive on the world market. The only mining operations left in the Netherlands in 2001 were involved in the extraction of limestone, peat, salt, and sand and gravel. The metal processing sector relied almost exclusively on imported ores and concentrates and scrap (table 1).

Since the 1980s, the Government has reduced its role in the economy, and privatization has continued with little debate or opposition. Nevertheless, the Government continued to dominated the energy sector and played a large role in the aviation, chemicals, telecommunications, and transportation sectors (table 2).

Copper tube is a standard and widely used commodity for transporting water, gas, oil, and air in domestic and industrial systems. In 2001, HME Nederland was an established supplier of Securus® brand copper tubing worldwide and exported about 93% of its 16,000-metric-ton-per-year (t/yr) production. HME was one of the few companies that used the hydrostatic material extrusion process. In hydrostatic extrusion, a specially machined billet is surrounded by a film of oil so that there is no friction between it and the barrel and only low friction between the billet and the die. As the billet is forced through, the metal retains its basic configuration and is not turned inside-out as in a standard extrusion process. The raw materials for production are copper scrap and cathode. The latter were supplied by Metallo-Chimique of Belgium and made up from 25% to 50% of the charge. Scrap includes revert plus granules and cable scrap (Karpel, 2001).

The Central Bank had plans to sell 300 metric tons (t) of gold, which was about one-third the nation's gold reserve. According to the timetable, 100 t was sold in 2000, and the remaining 200 t was to be sold between 2001 and 2005; the bank had sold 400 t in 1992 (Engineering and Mining Journal, 2000).

Corus Group closed its 900,000-t/yr rebar mill at the IJmuiden works. It also closed a blast furnace, although the No. 2 furnace at the plant will continue to operate to supply the sheet steel plant. Corus's strategy will be to concentrate on value-added products, such as the high-tech sheet that the plant produces (Metal Bulletin, 2001).

Owing to oversupply and falling prices, Akzo Nobel Salt BV was cutting capacity for its packaged salt in favor of its bulk grades. In place of the 200,000-t/yr packaged salt production at Hengelo, Akzo will increase the production of bulk salt to 2.1 million metric tons per year. About 95% of Akzo's sales to the chemical industry was for the production of chlorine; the other 5% was for the production of sodium sulfate, which is used in the manufacture of soap. Akzo also produced bulk salt at Delfzjil (Industrial Minerals, 2001).

BP Netherlands and ChevronTexaco Corp. announced that they would build and operate a 22.5-megawatt (MW) wind farm at their jointly owned Nerefco refinery near Rotterdam. The $23 million project was due to begin operations midyear 2002. It will generate electricity equivalent to the consumption of 20,000 households per year. The project will consist of nine state-of-the-art wind turbines, each with a generating capacity of 2.5 MW. The area location is on the shoreline with exposure to strong and consistent winds and access to the national power grid. The Dutch Government has set a target to increase the amount of electricity generated from renewable sources to 5% by 2005 (BP Group, 2002§).

The Netherlands was active on the international energy supply scene in more than one respect. The country supplied energy to Europe by pipelines and other methods and served as the entrepôt for oil products for northwestern Europe.

After Nederlandse Aardolie Maatschappij BV (NAM) struck one of the largest gasfields in the world in the north of the Netherlands in 1959, the decision was made to begin drilling for natural gas and petroleum in the North Sea. Natural gas has become the most important mineral fuel produced in the Netherlands. The Groningen Gasfield at Slochteren is one of the world's largest producing natural gasfields.

NAM reported a discovery in the North Sea with estimated reserves of 11 billion cubic meters. The field, which was located at a depth of 3,500 meters in the Rotiegend sandstone formation, is situated in the K15 block concession. The field was considered to be large enough to supply households in the four biggest Dutch cities with their natural gas requirements for 5 years (Alexander's Gas and Oil Connections, 2001).

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[1] References that include a section twist (§) are found in the Internet References Cited section.

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2000 AD Haarlem, Netherlands

Ministry of Economic Affairs
2500 EC The Hague, Netherlands

TABLE 1
NETHERLANDS: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/	1997	1998	1999	2000	2001 e/
METALS					
Aluminum metal:					
Primary	231,800	264,000 e/	286,400	301,700 r/	294,100 3/
Secondary	150,400	102,000	88,000 r/	119,000 r/	120,000
Cadmium metal, primary	718	739	731	628	455 3/
Iron and steel:					
Ore, sintered (from imported ore)	4,250,000 e/	3,376,000	3,094,000	3,000,000 e/	3,000,000
Metal:					
Pig iron, including blast-furnace ferroalloys (if any)	5,804,000	5,561,000	5,307,000	4,969,000	5,305,000 3/
Steel:					
Crude	6,640,000	6,379,000	6,077,000	5,667,000	6,037,000 3/
Semimanufactures	5,175,000	4,964,000	4,786,000 r/	4,956,000 r/	5,335,000 3/
Lead, metal, refined, secondary	19,500 e/	13,200	19,900	22,200 r/	24,400 3/
Zinc, metal, primary	208,800	218,700	221,400	216,800 r/	204,800 3/
INDUSTRIAL MINERALS					
Cement, hydraulic thousand tons	3,220	3,235 r/	3,480 r/	3,450 r/	3,400
Magnesium compounds: e/					
Chloride	25,000	25,000	23,000	25,000	25,000
Oxide	10,000	10,000	10,000	10,000	10,000
Nitrogen, N content of ammonia thousand tons	2,478 3/	2,350 e/	2,428 3/	2,543 3/	1,939 3/
Salt, all types e/ do.	5,500	5,500	5,000	5,000	5,000
Sand, industrial e/ do.	24	14	15	15	15
Sodium compounds, n.e.s.: e/					
Carbonate, synthetic	400,000	400,000	350,000	350,000	350,000
Sulfate:					
Natural	20,000	20,000	20,000	20,000	20,000
Synthetic	15,000	15,000	15,000	15,000	15,000
Sulfur: e/					
Elemental byproduct:					
Of metallurgy	150,000	131,000	129,000	123,000 3/	126,000 3/
Of petroleum and natural gas	138,000	432,000	445,000	428,000 3/	384,000 3/
Total	288,000	563,000	574,000	551,000 3/	510,000
Sulfuric acid, 100% H_2SO_4	1,250,000	1,250,000	1,000,000	1,000,000	1,000,000
MINERAL FUELS AND RELATED MATERIALS					
Coke, metallurgical	2,800,000 e/	2,829,000	2,247,000	2,300,000 e/	2,300,000
Gas:					
Manufactured e/ million cubic meters	10,000	10,000	10,000	10,000	10,000
Natural:					
Gross do.	80,000 e/	76,331	68,528	69,180 r/	74,232 3/
Marketed do.	86,000 e/	75,201	67,228	68,157 r/	73,296 3/
Natural gas liquids e/ thousand 42-gallon barrels	170,000	170,000	160,000	170,000	160,000
Petroleum:					
Crude do.	21,276	19,164	18,978 r/	17,633 r/	18,000
Refinery products: do.					
Liquefied petroleum gas do.	36,000 r/ e/	34,561 r/	44,904 r/	42,711 r/	42,000
Mineral jelly and wax do.	600 e/	936	927 r/	896 r/	900
Gasoline, motor do.	75,000 e/	76,653	112,651 r/	121,669 r/	120,000
Naphtha and white spirit do.	50,000 e/	45,960	77,537 r/	96,076 r/	90,000
Kerosene and jet fuel do.	40,000 e/	50,808	55,816	59,888 r/	60,000
Refinery gas do.	20,000 e/	11,858	11,480	10,486 r/	11,000
Diesel oil do.	160,000 e/	159,100	161,733 r/	164,060 r/	160,000
Residual fuel oil do.	85,000 e/	102,605	81,127	72,900 r/	81,000
Bitumen do.	4,500 e/	4,499	4,260	4,130 r/	4,200
Unspecified do.	25,000 e/	31,913	40,075 r/	41,349 r/	40,000
Total do.	496,000 e/	518,893 r/	590,510 r/	614,165 r/	609,000

e/ Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. r/ Revised.

1/ Table includes data available through March 2002.

2/ In addition to the commodities listed, the Netherlands produced construction materials, such as sand and gravel, but output was not reported, and no basis exists to make reliable estimates of output.

3/ Reported figure.

TABLE 2
NETHERLANDS: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facility	Annual capacity
Aluminum			
Primary	Pechiney Nederland NV	Smelter at Vlissingen	175
Do.	Corus Group	Smelter at Delfzijl	100
Secondary	Alumax Recycling BV	Smelter at Kerkade	50
Cadmium tons	Budelco BV (Australian Overseas Smelting Pty. Ltd, 50%; Kempensche Zinkmaatschappij Zincs de la Campine BV 50%)	Plant at Budel-Dorplein	650
Cement	ENCI Nederland BV (Eerste Nederlandse Cement Industrie NV)	10 plants at Maastrict	2,700
Do.	Cementfabriek IJmuiden BV	Three plants at IJmuiden	1,600
Do.	Cementfabriek Rozenburg BV	Two plants at Rozenburg	920
Lead	Hollandse Metallurgische Industrie Billiton BV	Electrolytic plant at Arnhem	35
Do.	Billiton Witmetaal BV	Electrolytic plant at Naarden	6
Limestone	Ankerpoort NV (Lhoist SA, 100%)	Mines at Maastricht and Winterswijk	600
Magnesia	Nedmag Industries Mining & Manufacturing BV	Mine and plant at Veendam	150
Do.	MAF Magnesite BV	Plant at Schiedam	40
Nitrogen, N content of ammonia	Hydro Agri BV	Plant at Sluiskil	1,500
Natural gas million cubic meters per day	Nederlandse Aardolie Maatschappij BV (NAM)	Groningen, Leeuwarden, Assen, and other onshore gasfields and several offshore wells in the North Sea	225
Petroleum, crude barrels per day	AMOCO, CONOCO, and UNOCAL	766 wells (204 producing), including North Sea fields Haven, Helder, Helm, Hoorn, Kotter, Logger, and Rijn	83,500 (63,000)
Do. do.	Nederlandse Aardolie Maatschappij BV (NAM)	Onshore fields: Berkel, DeLier, Ijselmonde, Meerkapelle, Pernis, West, Pinacke, Rotterdam, Schoonebeck, Werkendam, and Zoetemeer	(20,500)
Refineries	Six companies, of which the major ones are:		1,230,500
	Netherlands Refining Co.	Refinery at Rotterdam	(446,000)
	Shell Nederland Raffinaderij BV	Refinery at Pernis	(374,000)
	Esso Nederland BV	Refinery at Rotterdam	(175,000)
	Total Raffinaderij Nederland NV	Refinery at Vlissingen	(150,000)
Salt	Akzo Nobel Salt BV (Akzo Nobel BV, 100%)	Mines at:	4,100
		Hengelo	(2,100)
		Delfzijl	(2,000)
Sand, silica	Lieben Minerals BV	Mines at South Limburg	150
Sodium:			
Carbonate, synthetic	do.	Plant at Delfzijl	380
Sulfate, synthetic	do.	do.	600
Steel	Corus Group	Plant at IJmuiden	6,100
Zinc	Budel Zinc BV (Pasminco Europe BV)	Plant at Budel-Dorplein	215

THE MINERAL INDUSTRY OF

NORWAY

By Chin S. Kuo

The economy of Norway was characterized by its substantial oil and gas revenues, shipping and fishing industries, and a small industrial base. The growth rate of the gross domestic product was 1.4% in 2001. Norway achieved a high living standard with a per capita income of $36,306 and a low inflation rate of 2.9% (U.S. Department of State, 2002§[1]). The country is richly endowed with natural resources—fishing, hydroelectric power, minerals, natural gas, petroleum, and timber. Norway produced 3.2 million barrels per day (Mbbl/d) of oil and vied with Russia to be the world's second largest oil exporter after Saudi Arabia.

The Ministry of Finance's new proposal allowed new fields to forego an offshore tax that could be as high as 78% through the early field development phase. It also proposed to split fiscal terms between the 78% offshore tax and the 28% corporate income tax in proportion with nondepreciated asset values for all oil companies that operate on the Norwegian continental shelf. The Norwegian Oil Industry Association claimed that the proposed tax changes would undermine new offshore field development (Oil & Gas Journal, 2001b).

The partial privatization of Statoil AS called for selling up to one-third of Statoil's shares to private investors; 15% to 25% would be sold through the initial public offering in June 2001. Statoil would have the opportunity to acquire 15% of the state's direct financial interest (SDFI) assets in the Norwegian continental shelf for $4.25 billion. The company indicated that it was interested in increasing its stake in the Tampen area; this would boost its production and reserve base by 50%. Norsk Hydro A/S and other companies could buy up to 6.5% of the SDFI (Oil & Gas Journal Online, 2001§). Norsk Hydro was expected to focus on increasing its stake in the Oseberg area. The 78.5% of the SDFI portfolio not sold would be entrusted to a new state-owned limited company. The Government also was expected to separate oil and gas transportation assets to an independent company.

A final decision on the expansion at Norsk Hydro's Sunndal aluminum smelter was expected in mid-2001, and completion was expected in October 2004. Hydro Aluminium ANS signed a letter of intent with AF Sunndal for a contract worth $70 million. Construction work would start in June. The new potlines would bring total production capacity to 321,000 metric tons per year (t/yr) when they came onstream in 2007. The new 234,000-t/yr smelter would use Hydro's HAL250 technology. Sunndal would become Europe's largest aluminum smelter (Hugin Online, 2001a).

Norsk Hydro's Holmestrand rolling mill started operating its new cold-rolling and slitting system that makes thinner aluminum coil. The new mill increased its production capacity to 90,000 t/yr from 70,000 t/yr at a cost of $28.6 million. Norsk Hydro's rolled products division as a whole used 127,000 t/yr of secondary aluminum. Its remelting facilities in Europe and the United States had a total capacity of 550,000 t/yr (Metal Bulletin, 2001c).

Fundia AB of Finland planned to stop production of H-beams at its Mo i Rana steel section mill in Norway. Its H-beam capacity was 100,000 t/yr. The company, however, would continue to produce shipbuilding sections and other special sections on an order-by-order basis (Metal Bulletin, 2001b).

CCB Stal (a subsidiary of Rautaruukki Oy of Finland) bought AvestaPolarit's stainless stockholding operation in Norway. AvestaPolarit's warehouse and premises in Oslo employed 20 workers. CCB Stal would become Norway's leading stainless stockholder after the deal. The group aimed to supply a full range of aluminum products and steel, which included stainless and engineering grades (Metal Bulletin, 2001d).

Elkem A/S planned to suspend ferrosilicon production of 30,000 t/yr at its Salten works owing to weak market conditions. One of the three furnaces would be closed. The country's total ferrosilicon production capacity was 485,000 t/yr (Metal Bulletin, 2001a).

Norsk Hydro planned to cut back magnesium production by closing its Porsgrunn plant in the Grenland district. Production at the 42,000-t/yr magnesium smelter would be wound down in 6 months. The possibility of continuing to operate the cast house alone by recovering recycled scrap metal and upgrading metal from other producers was being studied. Norsk Hydro had a total production capacity of 87,000 t/yr. The company would continue to be the world's leading player in the market for alloyed magnesium (Hugin Online, 2001b).

Crew Development Corp. of Canada's zinc exploration program in an area of 3,000 square kilometers in the Roros district of central Norway was completed. A total 1,788 meters was drilled from 21 holes in 3 targeted areas. In addition, 40 new targeted areas were identified, surveyed, and mapped by ground geophysical methods, and more than 900 new deep soil samples were collected and analyzed. The drilling program confirmed the existence of extensive stratiform sulfide mineralization with dimensions of a type that could host commercial deposits (Business Wire, 2001§).

Outokumpu Oyj of Finland bought Norzink A/S and Noralf A/S (its aluminum fluoride processing subsidiary), which had the zinc smelter and plant located near Odda, 250 kilometers (km) west of Oslo, in southern Norway. The 50% interests were acquired from Boliden Mineral AB and Rio Tinto plc for a total of $180 million. Norzink had a production capacity of 150,000 t/yr of zinc. With a capacity of 228,000 t/yr, Noralf was one of the largest aluminum fluoride producers in Europe and the sixth largest in the world. Noralf had begun production of anhydrite with a capacity of 70,000 t/yr in 1999 (Industrial Minerals, 2001).

The Government awarded five new oil and gas operator licenses and eight new partnership licenses for the Norwegian North Sea. In total, 11 companies were awarded licenses in 15 blocks or parts of blocks. Statoil was awarded one operator license. Aker Maritime and Norsk Hydro received offers of participation in licenses. The SDFI secured only a license share in one block (Alexander's Gas & Oil Connections, 2001§).

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[1] References that include a section twist (§) are found in the Internet References Cited section.

Partners in the Statoil-operated Mikkel Field in the Norwegian Sea submitted a development and operation plan that called for production of gas and condensate to start in 2003 and continue until 2017 at a development cost of $255 million. Development would involve production of 20 billion cubic meters per day of gas and 30 million barrels per day of condensate through four production wells. Statoil had a 56.52% stake; partners ExxonMobil Corp. had 33.48%, and Norsk Hydro, 10%. Mikkel Field lies on the Halten Bank, 35 km south of the Midgard deposit on the Asgard license. The 707-km Asgard transport trunkline would transport gas to the processing plant at Karsto, north of Stavanger. Condensate would flow through an existing line to the Asgard C storage ship for export (Oil & Gas Journal, 2001a).

Statoil opened its Karsto processing plant and Asgard gas transport system. Karsto would be Europe's largest natural gas treatment complex. Norwegian gas deliveries to Europe would plateau in 2005 with exports of 70 billion cubic meters per year, of which 15% would come from Asgard Field (Oil & Gas Journal, 2001c).

Statoil also started the gas export line that eventually will supply 25 million cubic meters per day from the Gullfaks area in the Norwegian North Sea to the Karsto gas complex prior to send-out to the Statpipe trunkline for transport to Europe. Gas deliveries from Gullfaks rose to 20 million cubic meters per day in October from 13 million cubic meters per day in April. The export level from Gullfaks Field was expected to reach a plateau in 2004 (Oil & Gas Journal, 2001d).

Norsk Hydro received approval from the Ministry of Petroleum to develop Farm West and Vale Fields in the North Sea. Farm West would be developed at a cost of $440 million and had reserves of 100 million barrels (Mbbl) of oil and 8 billion cubic meters of natural gas. First flow from Farm West was scheduled for October 2003. The Vale gas-condensate field would be developed at a cost of $100 million and had reserves of 21 Mbbl of condensate and 2.5 billion cubic meters of gas. First flow from Vale was set for June 2002 (Oil & Gas Journal, 2001e).

The Glitne Oilfield was the smallest discovery on the Norwegian continental shelf and was brought onstream by Petroleum Geo-Services in 2001. Glitne is on blocks 15/5 and 15/6, 40 km northwest of Sleipner Field. Owners were Statoil with 68.9%; TotalFinaElf, 21.8%; and Norsk Hydro, 9.3%. Glitne contained 25 Mbbl of recoverable oil and had an estimated production life of 3 years (Oil & Gas Journal, 2001g).

Norsk Agip (a unit of ENI of Italy) confirmed an oil discovery on the Goliath Field, 85 km north of Hammerfest in the Norwegian Barents Sea. The Goliath Field was estimated to contain from 175 to 300 Mbbl of oil equivalent with recoverable reserves of 35 to 40 Mbbl of oil equivalent. Norsk Agip was the operator with 25% interest; the other partners were the Norwegian Petroleum Directorate with 25%; Phillips Petroleum Company Norway, 20%; Enterprise Oil, 15%; and Fortum, 15% (Oil & Gas Journal, 2001h).

Statoil's Huldra Field began production of gas and condensate in the North Sea. Huldra had a simple processing plant for separating condensate and gas. Condensate was piped to the Veslefrikk A platform 16 km away for processing, and gas was sent to the Norsk Hydro-operated Heimdal Field. The field is on blocks 30/2 and 30/3. Statoil was the operator with a 51.62% interest (Oil & Gas Journal, 2001i).

Statoil awarded Kvaerner a $73.3 million contract to upgrade its 200,000-barrel-per-day Mongstad refinery near Bergen to comply with new European fuel specifications for 2005. The project was slated for completion by yearend 2001. The refinery was operated by Mongstad Refining in which Statoil owned 79% interest and Norske Shell Raffinering owned 21% (Oil & Gas Journal, 2001f).

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Major Sources of Information

Norwegian Geological Survey
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TABLE 1
NORWAY: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1997	1998	1999 e/	2000 e/	2001 e/
METALS						
Aluminum:						
Primary		918,558	995,619	1,020,215 2/	1,025,676 2/	1,067,600 2/
Secondary		58,635	62,400	178,313 2/	260,000	265,000
Cadmium, smelter		290	270 e/	211 2/	298 2/	318 2/
Cobalt		3,417	3,851	4,009 2/	3,433 2/	3,134 2/
Copper:						
Mine output:						
Concentrate		28,000	11,000 e/	--	--	--
Cu content		6,671	2,698	--	--	--
Metal, primary and secondary, refined		32,639	31,658	33,262 2/	27,000	26,700 2/
Iron and steel:						
Iron ore and concentrate, Fe content	thousand tons	462	382	355 2/	369 2/	340
Metal:						
Pig iron e/	do.	70	70	60	60	60
Ferroalloys:						
Ferrochromium	do.	145 e/	175	160	154 r/ 2/	83 2/
Ferromanganese	do.	235	235	235	235	240
Ferrosilicomanganese e/	do.	230	230	230	230	230
Ferrosilicon (75% basis)	do.	470 e/	470 e/	460	460	450
Silicon metal	do.	110 e/	110 e/	100	100	100
Other e/	do.	15	15 e/	15	15	15
Total e/	do.	1,210	1,240	1,200	1,190 r/	1,120
Steel, crude	do.	570	644	611 2/	620	630
Semimanufactures, rolled e/	do.	300	300	300	300	300
Lead, mine output:						
Concentrate		2,600	--	--	--	--
Pb content		2,000	--	--	--	--
Magnesium, primary		34,200	35,400	40,800 r/	41,400 r/	40,000
Nickel:						
Mine output:						
Concentrate e/		20,000	20,000	21,000	18,000	18,000
Ni content		2,454	2,959	2,965 2/	2,538 2/	2,529 2/
Metal, primary		62,702	70,151	74,137 2/	58,679 2/	68,220 2/
Platinum-group metals e/ 3/	kilograms	1,000	1,000	1,000	1,000	1,000
Titanium: e/						
Ilmenite concentrate	thousand tons	750	590	580 2/	610	600
TiO2 content	do.	340	260	257 2/	270	265
Zinc:						
Mine output:						
Concentrate		15,800	--	--	--	--
Zn content		7,900	--	--	--	--
Metal, primary		137,400	128,000	132,600 2/	125,800 2/	129,300 2/
INDUSTRIAL MINERALS						
Cement, hydraulic	thousand tons	1,724	1,676	1,827 r/ 2/	1,851 r/ 2/	1,870 2/
Feldspar e/		75,000	75,000	72,777 2/	75,000	73,000
Graphite e/		2,600	2,600	2,500	2,500	2,500
Lime, hydrated, quicklime e/	thousand tons	100	100	100	100	100
Mica, flake e/		2,500	2,500	2,500	2,500	2,500
Nepheline syenite e/	thousand tons	300	300	305 2/	300	310
Nitrogen, N content of ammonia	do.	279	245	122 2/	334 2/	323 2/
Olivine sand e/	do.	3,600	3,600	3,162 2/	3,200	3,300
Pyrite e/	do.	5	5	-- 2/	--	--
Stone, crushed:						
Dolomite e/	do.	800	800	893 2/	900	900
Limestone e/	do.	4,500	4,500	6,915 2/	7,000	7,500
Quartz and quartzite	do.	1,000 e/	1,000	1,314 2/	1,300	1,500
Sulfur, byproduct of:						
Metallurgy	do.	105 r/	98 r/	97 r/ 2/	92 r/ 2/	105 2/
Petroleum	do.	18 r/	14 r/	12	18 r/ 2/	18 2/
Total	do.	123 r/	112 r/	109 r/	110 r/	123
Talc, soapstone, steatite e/	do.	28	26	26	27	27

See footnotes at end of table.

TABLE 1--Continued
NORWAY: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1997	1998	1999 e/	2000 e/	2001 e/
MINERAL FUELS AND RELATED MATERIALS						
Coal, all grades	thousand tons	260 e/	250	328 2/	330	320
Gas, natural, marketed 4/	do.	42,600 e/	43,600	43,000	42,000	41,000
Peat, for agricultural use e/	do.	30	30	30	30	30
Petroleum:						
Crude 5/	thousand 42-gallon barrels	1,105,584	1,100,000 e/	1,100,000	1,000,000	1,000,000
Natural gas liquids e/	do.	42,000	42,000	42,000	41,000	41,000
Refinery products: e/						
Naphtha	do.	26,000	26,000	26,000	26,000	27,000
Gasoline	do.	25,000	25,000	25,000	26,000	26,000
Kerosene	do.	9,000	9,000	9,000	9,000	9,000
Distillate fuel oil	do.	45,000	45,000	45,000	46,000	46,000
Residual fuel oil	do.	12,000	12,000	12,000	12,000	12,000
Other	do.	4,000	4,000	4,000	4,000	4,500
Refinery fuel and losses	do.	4,000	4,000	4,000	4,000	4,500
Total	do.	125,000	125,000	125,000	127,000	129,000

e/ Estimated; estimated data are rounded to three significant digits; may not add to totals shown. r/ Revised. -- Zero.

1/ Table includes data available through August 6, 2002.

2/ Reported figure.

3/ Data represent exports.

4/ Reported as total methane sales.

5/ Excluding natural gas liquids.

TABLE 2
NORWAY: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Aluminum	Hydro Aluminium ANS (Norsk Hydro A/S, 70%)	Smelters at Årdal, Hoyanger, Karmoy, and Sunndalsora	600
Do.	do.	Plant at Holmestrand	90
Do.	Elkem Aluminium (Elkem A/S, 50%; Alcoa Inc., 50%)	Smelters at Farsund and Mosjoen	250
Do.	Sor-Norge Aluminium A/S (Alusuisse Group, 50%; Hydro Aluminium ANS, 49%)	Smelter at Odda	50
Cadmium	Norzink A/S (Outokumpu Oyj, 100%)	Smelter at Eitrheimsneset	0.3
Cement	Norcem A/S	Plants at Brevik and Kjopsvik	2,150
Coal	Store Norske Spitsbergen Kulkompani A/S	Mines at Longyearbyen and Svea	450
Cobalt	Nikkelverk A/S (Falconbridge Nickel Mines Ltd., 100%)	Smelter at Kristiansand	3
Copper:			
Ore, Cu content	Grong Gruber A/S (Norsulfid A/S, 100%)	Mines at Royrvik and Gjersvik	8
Do.	Nikkel og Olivin A/S (Norsulfid A/S, 100%)	Mine at Narvik	1
Metal	Nikkelverk A/S (Falconbridge Nickel Ltd., 100%)	Smelter at Kristiansand	40
Dolomite	Franzefoss Bruk A/S	Mine at Ballagen	350
Do.	Norwegian Holding A/S	Mines at Hammerfall, Logavlen, and Kvitblikk	500
Feldspar	Franzefoss Bruk A/S	Mine at Lillesand	100
Ferroalloys	Elkem Rana (Elkem A/S, 100%)	Ferrochromium plant at Mo i Rana	140
Do.	Elkem Salten (Elkem A/S, 100%)	Ferrosilicon plant at Straumen	90
Do.	Elkem Bjolvefossen (Elkem A/S, 100%)	Ferrosilicon plant at Alvik	60
Do.	Elkem Thamshavn (Elkem A/S, 100%)	Ferrosilicon plant at Orkanger	60
Do.	Finnfjord Smelteverk AS, Rana Metal (FESIL ASA, 100%)	Ferrosilicon plant at Mo i Rana	140
Do.	A/S Hafslung Metal (FESIL ASA,100%)	Ferrosilicon plant at Sarpsborg	75
Do.	Ila og Lilleby Smelteverk (FESIL ASA, 100%)	Ferrosilicon plant at Finnsnes	60
Do.	Oye Smelteverk (Tinfos Jernverk A/S, 100%)	Silicomanganese plant at Kvinesdal	235
Iron, metal	Ulstein Jernstoperi A/S	Hordvikneset	10
Iron ore	Rana Gruber A/S (Norsk Jernverk Holding A/S, 100%)	Mine at Mo i Rana	2,000
Do.	Artic Bulk Minerals A/S	Mine and plant at Kirkenes	1,500
Lead ore, Pb content	A/S Bleikvassli Gruber (A/S Sydvaranger, 100%)	Mine at Bleikvassli	2

TABLE 2--Continued
NORWAY: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Lime	Hylla Kalkverk (Nikolai Bruch A/S, 100%)	Verdal/Trondheim Mine and plant	80
Do.	A/S Norsk Jernverk	Plant at Mo i Rana	48
Do.	Ardal og Sunndal Verk A/S	More og Romsdal Mine at Surnadal	20
Do.	Breivik Kalkverk A/S	Alesund Mine at Larsnes	20
Do.	Mjoendalen Kalkfabrik	Plant at Asen/Drammen	7
Limestone	Norcem A/S	Dalen, Bjorntvedt, and Kjopsvik Mines	1,600
Do.	Vardelskalk A/S (Franzefoss Burk A/S, 100%)	Sandvika Mine	800
Do.	Breivik Kalkverk A/S	Visnes and Glaerum Mines	500
Magnesium	Norsk Hydro A/S (Government, 51%)	Plants at Porsgrunn and Sauda	50
Manganese, alloys	Eramet SA	do.	500
Natural gas million cubic meters	Den Norske Stats Oljeselskap A/S	Gama, Gullfaks, Sleipner Ost, and Statfjord Fields	12,270
Do.	Phillips Petroleum Company Norway	Ekofisk Field	9,900
Do.	Elf Petroleum Norge A/S	Frigg, Heimdal, and Ost-Frigg Fields	5,750
Do.	Norsk Hydro Produksjon A/S	Troll-Oseberg Field	2,600
Do.	BP Petroleum Development of Norway	Gyda and Ula Fields	1,040
Do.	Esso Norge A/S	Odin Field	1,000
Do.	Amoco Norway A/S	Hod and Valhall Fields	910
Nepheline syenite	North Cape Mineral A/S (Unimin Corp., 84%)	Mine at Stjernoy	350
Nickel:			
Ore, Ni content	Nikkel og Olivin A/S (Norsulfid A/S, 100%)	Mine at Narvik	3
Do.	Titania A/S (Kronos Norge A/S, 100%)	Mine at Tellnes	0.5
Metal	Nikkelverk A/S (Falconbridge Nickel Mines Ltd., 100%)	Smelter at Kristiansand	85
Olivine	A/S Olivin	Åheim Mine and plant	2,500
Do.	do.	Stranda Mine and plant	300
Do.	Franzefoss Bruk A/S	Lefdal Mine at Bryggja	500
Petroleum barrels per day	Den Norske Stats Oljeselskap A/S	Gullfaks, Statfjord, Tommeliten, and Veslefrikk Fields	1,069,300
Do.	Norsk Hydro Produksjon A/S	Brage, Mime, and Oseberg Fields	566,200
Do.	Phillips Petroleum Company Norway	Ekofisk Field	237,500
Do.	Saga Petroleum A/S	Snorre Field	170,000
Do.	BP Petroleum Development of Norway	Gyda and Ula Fields	155,000
Do.	A/S Norske Shell	Draugen Field	90,000
Pyrite	Folldal Verk A/S (Norsulfid A/S, 100%)	Mine at Hjerkinn	10
Quartzite	Elkem Tana (Elkem A/S, 100%)	Mine at Tana	540
Do.	Elkem Marnes (Elkem A/S, 100%)	Mine at Sandhornoy	200
Do.	Vatnet Kvarts A/S	Mine at Nordland	150
Do.	Snekkevik Kvartsbrudd	Mine at Kragero	110
Silicon metal	Lilleby Metall A/S (FESIL ASA, 100%)	Plant at Trondheim	9
Steel	Fundia AB (Norsk Jenverk, 50%; Rautaruukki Group, 50%)	Plants at Christiania, Spigerverk, Mandal Stal, and Mo i Rana	600
Talc	A/S Norwegian Talc (Pluess-Staufer AG, 51%)	Mine and plant at Altermark/Knarrevik and Framfjord	90
Do.	Kvam Minerals A/S	Mine and plant at Kvam	6
Titanium, concentrate	Titania A/S (Kronos Norge A/S, 100%)	Mine at Tellnes	800
Zinc:			
Ore, Zn content	A/S Bleikvassli Gruber (A/S Sydvaranger, 100%)	Mine at Bleikvassli	10
Metal	Norzik A/S (Outokumpu Oyj, 100%)	Smelter at Odda	150

THE MINERAL INDUSTRY OF

PORTUGAL

By Harold R. Newman

Portugal is essentially an agricultural country. The mineral industry was modest by world standards in terms of mineral production. The mineral industry growth rate during the past few years, however, has made it one of the country's significant industrial sectors. This was mainly because of the discovery and development of the rich copper and tin deposits at Neves-Corvo by Sociedade Mineira de Neves-Corvo S.A. (Somincor). Portugal was the largest producer of mined copper in the European Union (EU). The country was also an important producer of dimension stone and tungsten concentrates.

The southern Iberian Peninsula, which is known as the Iberian Pyrite Belt (IPB), is one of the most mineralized areas of Western Europe and is geologically very complex. Massive sulfides linked to synorogenic volcanism in the southwestern part of the peninsula are well-known internationally. The metallogenic province stretches about 250 kilometers (km) from Seville, Spain, to the southwestern coast of Portugal.

The IPB's volcanogenic massive sulfide (VMS) deposits, which date to the Upper Devonian and the Lower Carboniferous ages, were deposited during submarine felsic volcanism. Clusters of deposits occur around individual volcanic centers; the ore lies in zones within volcanic and sedimentary host-rock sequences.

The Government continued with the country's privatization program and was proceeding with legislation that would privatize many public companies. The privatization issue was part of a broader program to reduce the role of the state and to restructure the Portuguese economy to one that is more market driven.

Portugal's economic growth during the past decade has been accompanied by heavy investment in infrastructure improvements, which have been largely funded by the EU. Portugal has successfully parlayed a dozen years of EU funding into strong economic growth and substantial new foreign investment. The country has made a number of major infrastructure improvements, most notably a system of modern highways. Additional infrastructure projects, which included a new international airport at Lisbon, an upgrade of the country's rail system, a second phase of a natural gas pipeline system, and additional dams and port projects, were expected (U.S. Department of Commerce, 2002§[1]).

In 2001, Portugal's inflation rate was 4.4%, which was well above the EU average, and economic growth slowed to 1.8%. Given the key importance of Portugal's trade with the EU, the growth rate will be affected by the performance of other EU economies, particularly Germany and Spain. Portugal became the first European Monetary Union member to breach the EU Stability and Growth Pact when it ended the year with a budget deficit of 4.1% of gross national product, which was well above the 3% agreed under the Pact (Australian Department of Foreign Affairs and Trade, 2002§).

The Neves-Corvo Mine of Somincor and the Panasqueira Mine of Avocet Mining plc were the two major operations in the metals mining sector. Pirites Alentejanas S.A.R.L. was the country's largest producer of pyrite. Lusosider Aços Planos SA and SN Longos SA were the major steel producers. Cimentos de Portugal S.A. (Cimpor), which was an important producer of cement, was one of the companies included in the Government's privatization plans. With the exception of copper, dimension stone, ferroalloys, tin, and tungsten, which were of international importance, production of other minerals and related materials had only domestic significance. Most of the large mineral-related companies were owned or controlled by the Government, although some operations were privately owned (table 2).

The Neves-Corvo Mine used a drift-and-fill mining method that was designed to produce 1.5 million metric tons per year of raw ore to yield a concentrate with an average copper content of 26%. A conventional drilling, blasting, and mucking cycle were used. Primary crushing of ore was underground, and the ore was moved by a conveyor to a vertical shaft where it was hoisted to the surface for secondary crushing and treatment. Based on estimated reserves, production was expected to last until at least 2010 (Richards and others, 1991).

In 2000, Rio Tinto Ltd. informed the Portugese Government that it was selling its 49% interest in Somincor and initiated a search for prospective candidates. Murchison United of Australia was chosen as the preferred bidder in conjunction with Outokumpu Oyi of Finland. Rio Tinto said the decision reflected its increasing focus on larger scale open pit copper operations. The state-holding company Empressa Desenvolvimento Mineiro (EDM) was also prepared to sell a 17% share, which would reduce its share to 34% from 51%. If the sale is finalized, then Murchison would own 58% of Somincor, and Outokumpu, 8%. Outokumpu's involvement was designed to secure concentrate supply for its Harjavalta smelter in Finland (Metal Bulletin, 2001).

Gold exploration activities were continuing in the Jales-Tres Minas District. The joint venture of Sociedade des Mines du Bourneix and EDM was reevaluating some of the old deposits that had not been worked for some time. The area includes the ancient Jales Mine and is 150 km east of Oporto. By the end of its operation in the 1980s, the Jales Mine had produced more than 25 metric tons (t) of gold and more than 100 t of silver and reached a depth of 600 meters (m) (Neiva and others, 1989).

Connary Minerals plc announced that further exploration at the Banjas Mine within its Valongo Gondomar licence area confirmed the high gold values reported previously but over a more extensive area. The detailed underground mapping of structures, quartz veins and lodes, along with channel sampling was completed. Out of a total of 73 channel samples 1 m wide, 29 averaged more than 4 grams per metric ton (g/t) gold. The gold mineralization is associated with argillites. Underground drilling was planned to intersect the structures at different levels to test the possibility of a sequence of stacked argillites being present that would be of sufficient volume to mine economically (Mining Journal, 2001).

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[1] References that include a section twist (§) are found in the Internet References Cited section.

Beralt Tin and Wolfram S.A., which was owned by Avocet Mining plc, operated the Panasqueira Mine, which was one of the world's largest producers of tungsten concentrates outside of China. Avocet commissioned a new subvertical shaft that accessed 4.7 million metric tons (Mt) of estimated ore resources with an in situ grade of 0.33% tungsten oxide (WO_3), given an estimated 10-year life at current extraction rates. Avocet was continuing a program to develop these WO_3 resources to a mining reserve category with the possibility of expanding production (Avocet Mining plc, 2001§).

EuroZinc Mining Corp. announced that it had purchased EDM's controlling interests in the Aljustrel zinc project, which encompassed five massive sulfide deposits—Algares, Estação, Feitas, Gavião, and Moinho. These are typically zoned VMS deposits with barite, lead, silver, and zinc zones found at the top of the deposits and copper zones at the bottom of the deposits and are often separated by tens of meters of low-grade pyrite. The purchase included operating permits, modern mill facilities, underground development, buildings and a dedicated port facility (EuroZinc Mining Corp., 2001§).

The Feitais deposit was the most significant deposit in the Aljustrel project area because of its high zinc content, large tonnage, and existing infrastructure. It has extensive underground development in place. The deposit has a known strike length of 700 m; a projected strike length, based on gravity data, of 1,200 m; an average width of about 400 m; and an average thickness of about 60 m. The estimated proven and probable mineable reserves were 12 Mt of zinc ore with an average grade of 5.67% zinc, 1.7% lead, and 64 g/t silver. Proven and probable mineable reserves were estimated to be 1.6 Mt of copper ore with an average grade of 2.2% copper, 0.97% zinc and 14 g/t silver (EuroZinc Mining Corp., 2002§).

Portugal's industrial minerals sector was a modern and efficient producer of a variety of materials, most notably dimension stone and minerals for the manufacture of ceramics. The dimension stone industry continued to be an important segment of the mining industry in terms of value and trade.

Demand for cement continued because the building and construction industry maintained a high level of activity. This situation was expected to continue. The development of Portugal's infrastructure is expected to create a substantial volume of work requiring cement in coming years.

Several international groups were interested in acquiring a stake in Cimpor. The Government was preparing to sell a 10% share. Lafarge Group of France and Holcim Ltd. of Switzerland expressed interest along with the Portugese construction company Teixeira Duarte. Cimpor operated in Portugal, Spain, Mozambique, Morocco, Egypt, Tunisia, and Brazil (International Cement Review, 2001).

Marble was the most valuable of the stone products and accounted for the majority of stone production. The main area for marble mining continued to be the Evora District.

Since the closure in 1996 of Empresa Carbonifera de Douro S.A.R.L.'s Germunde Mine at Castello de Pavia, most coal has been imported. The mine closed because of high production costs and difficult mining conditions.

Petroleos de Portugal (Petrogal) has embarked on an ambitious plan to reposition itself as a multinational energy firm. ENI Group of Italy was to acquire a 33.3% share of Galp Petroleos e Gas de Portugal which includes Petrogal and Gas de Portugal. The Portugese Government also planned to reduce its holdings to a minority stake through a public offering, thus making ENI the largest shareholder. ENI had plans to create a trans-European partnership that would also involve the Spanish power company Iberdrola SA. Petrogal itself has set basic targets—to develop its own production of hydrocarbons, to expand and upgrade its refineries to meet EU standards, to consolidate the distribution of petroleum products within the Iberian peninsula, to expand its cogeneration business, and to develop its chemicals business, namely aromatics (Wise, 2001§).

The present structure of the mineral industry could change in the near future because of significant mining exploration by several foreign companies. Copper, gold, kaolin, lead, lithium, pyrites, and tin were some of the minerals targeted for exploration. The IPB is the prime area for exploration activity and would appear to have an above-average potential for success on the basis of an unusually high number of large VMS deposits.

Portugal is one of the faster growing European economies but has limited domestic energy resources. Unless domestic gas resources come into production, energy imports are expected to increase significantly.

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TABLE 1
PORTUGAL: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1997	1998	1999	2000	2001 e/
METALS						
Aluminum, secondary e/	thousand tons	16	16	18	18	18
Arsenic, white e/		50	50	50	50	50
Beryl concentrate, gross weight e/		5	5	4	4	5
Copper, mine output, Cu content		106,479	114,637	99,459	76,200	82,965 2/
Iron and steel:						
Iron ore and concentrate:						
Gross weight, manganiferous e/		18,905 2/	18,000	16,000	15,000	14,500
Fe content, manganiferous		6,800	6,800 e/	11,733 r/	11,800 r/ e/	11,000
Metal:						
Pig iron	thousand tons	431	385	389	382 r/	82 2/
Steel, crude	do.	905	936 r/	1,038 r/	1,097 r/	728 2/
Lead, refined, secondary e/		6,000	6,500	6,000	5,000 r/	4,000
Manganese, Mn content of iron ore e/		500	500	500	500	500
Silver, mine output, Ag content	kilograms	33,900	31,900	26,450 r/	20,430 r/	23,100 2/
Tin:						
Mine output, Sn content		2,667	3,000 e/	2,163 r/	1,227 r/	1,200
Metal, primary and secondary e/		100	100	100	50 r/	--
Tungsten, mine output, W content		1,036	831	434 r/	743 r/	700
Uranium concentrate, U_3O_8		18	16	12 r/	16 r/	5 2/
Zinc, smelter, primary e/		3,600	3,600	4,000	3,600	3,600
INDUSTRIAL MINERALS						
Cement, hydraulic	thousand tons	9,395	9,784 r/	10,147 r/	10,343 r/	10,000
Clays:						
Kaolin 3/		180,000	180,000 e/	221,296 r/	162,674 r/	146,436 2/
Refractory e/		300,000	300,000	521,602 r/ 2/	712,951 r/	700,000
Diatomite e/		1,540	1,600	785 r/	686 r/ 2/	387 2/
Feldspar		121,380	120,000 e/	114,685 r/	119,837 r/	120,000
Gypsum and anhydrite e/		500.000	500,000	550,000	698,673	700,000
Lime, hydrated and quicklime e/		200,000	200,000	200,000	200,000	200,000
Lithium minerals, lepidolite		6,883	7,000	14,862 r/	9,352 r/	11,571 2/
Nitrogen, N content of ammonia		195,600	204,400	223,200	246,000 r/	201,600 2/
Pyrite and pyrrhotite (including cuprous), gross weight e/		10,000	10,000	10,000	10,000	10,000
Salt, rock		595,997	600,000 e/	558,807 r/ 2/	584,516 r/	625,785 2/
Sand e/	thousand tons	5,000	4,000	3,664 2/	8,311 r/	4,000
Sodium compounds, n.e.s.: e/						
Soda ash		150,000	150,000	150,000	150,000	150,000
Sulfate		50,000	50,000	50,000	50,000	50,000
Stone: e/						
Basalt		100,000	100,000	520,262 r/ 2/	500,000 r/	500,000
Calcareous:						
Dolomite	thousand tons	500	500	500	500	500
Limestone, marl, calcite	do.	15,000	15,000	35,580 r/ 2/	45,785 2/	45,000
Marble	do.	900	900	1,215 r/ 2/	933 2/	1,000
Diorite	do.	1,000	1,000	1,765 r/ 2/	1,700 r/	1,700
Gabbro	do.	100	100	100	100	100
Granite, crushed	do.	24,057 2/	25,000	22,400 r/ 2/	20,000 r/	20,000
Granite, ornamental	do.	400	500	458 2/	631 2/	500
Graywacke	do.	20	22	20	20	20
Ophite	do.	9	5	3	178 2/	180
Quartz	do.	14	15	15	38 r/ 2/	20
Quartzite	do.	500	500	573 r/ 2/	600 r/	600
Schist	do.	100	100	136 r/ 2/	149 2/	140
Slate	do.	30	40 r/	46 r/ 2/	40 r/	40
Syenite	do.	86	80	80	127 2/	130
Sulfur: e/						
Content of pyrites		5,000	5,000	-- r/	-- r/	--
Byproduct, all sources		30,000	30,000 r/	32,000 r/	30,000 r/	28,000
Total		35,000 r/	35,000 r/	32,000 r/	30,000 r/	28,000
Talc		8,236	8,400	9,554 r/	7,407 r/	7,500

See footnotes at end of table.

TABLE 1--Continued
PORTUGAL: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1997	1998	1999	2000	2001 e/
MINERAL FUELS AND RELATED MATERIALS						
Coke, metallurgical e/	thousand tons	330	330	325	325	300
Gas, manufactured e/	million cubic meters	125	125	125	125	125
Petroleum refinery products:						
Liquefied petroleum gas	thousand 42-gallon barrels	4,500	4,500 e/	3,874 r/	3,132 r/	3,200
Gasoline	do.	15,000	15,000 e/	22,679 r/	20,213 r/	20,000
Kerosene and jet fuel	do.	7,000 e/	7,500 r/ e/	7,680 r/	6,216 r/	6,500
Distillate fuel oil	do.	20,000	20,000 e/	31,727 r/	29,131 r/	30,000
Residual fuel oil	do.	20,000	20,000 e/	18,968 r/	18,828 r/	19,000
All other products	do.	10,000	10,000 e/	17,018 r/	15,067 r/	16,000
Refinery fuel and losses	do.	3,000	3,000 e/	4,031 r/	3,618 r/	3,800
Total	do.	79,500 r/	80,000 r/ e/	105,977 r/	96,205 r/	98,500

e/ Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. r/ Revised. -- Zero.

1/ Table includes data available through March 2002.

2/ Reported figure.

3/ Includes washed and unwashed kaolin.

TABLE 2
PORTUGAL: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of facilities	Annual capacity
Cement		Cimentos de Portugal S.A. (Cimpor) (Government, 10%)	Plants (3) at Alhandra, Loulé, and Souselas	5,450
Copper, concentrate		Sociedade Mineira de Neves-Corvo S.A. (Somincor) (Government, 51%; Rio Tinto Ltd., 49%)	Neves-Corvo Mine near Castro Verde	500
Diatomite		Sociedade Anglo-Portugesa de Diatomite Lda.	Mines at Obidos and Rolica	5
Feldspar		A.J. da Fonseca Lda.	Seixigal Quarry, Chaves	10
Ferroalloys		Electrometalúrgia S.A.R.L.	Plant at Setubal	100
Petroleum, refined	barrels per day	Petroleos de Portugal (Government 100%)	Refineries at Lisbon, Porto, and Sines	300,000
Pyrite		Pirites Alentejanas S.A.R.L.	Plant at Setubal	100
Steel, crude		SN Servicos S.A. (Corus Group, 50%, Usinor Group 50%)	Steelworks at Seixal	550
Do.		SN Longos S.A. (Metalurgica Galaica S.A., 50%, Riva Group, 50%)	do.	500
Tin		Somincor (Government, 51%; Rio Tinto Ltd., 49%)	Neves-Corvo Mine near Castro Verde	5
Tungsten		Avocet Mining plc	Panasqueira Mine and plant at Barroca Grande	1,600
Uranium	tons	Empresa Nacional de Uranio S.A. (Government 100%)	Mines at Guargia, plant at Urgeirica	150
Zinc, refined		RMC Quimigal S.A.R.L.	Electrolytic plant at Barreiro	12

THE MINERAL INDUSTRY OF

SPAIN

By Harold R. Newman

Spain, which has some of the most mineralized territory in Western Europe, was a significant European producer of nonferrous and precious metals. The main polymetallic deposits, from west to east, include Tharsis, Scotiel, Rio Tinto, and Aznalcollar. In terms of value of mine output of metallic and nonmetallic minerals and quarry products, Spain was one of the leading European Union (EU) countries. Consequently, it had one of the highest levels of self-sufficiency with respect to mineral raw materials among the EU members. Spain has a long history of base-metal mining, and although the number of active operations has halved in recent years, with copper production a notable casualty, the country remained an important lead and zinc producer (table 1).

Spain's economy continued to perform well. The Government estimated a 3.2% gross domestic product growth for 2001. Much of Spain's economic policy had focused on meeting the macroeconomic objectives of the Maastrich Treaty of 1992 so that it could become one of the founding members of the European Monetary Union (EMU). Spain's economic progress resulted in its qualification to enter the EMU in May 1998. In 2001, the economy continued to fall within the Maastrich guidelines with an inflation rate of 4%, an interest rate of 5.56%, and a Government deficit of 0.3% (U.S. Department of Commerce, 2002§[1]).

Government Policies and Programs

Legislation aimed at abolishing state and private monopolies passed in midyear 2000, and the Government was continuing with its program of liberalization of the Spanish industry in 2001. Electricity markets, natural gas, and petroleum were the key targets in the liberalization efforts (U.S. Energy Information Administration, 2002§).

Environmental Issues

Environmental issues in Spain include air pollution, deforestation, desertification, and pollution of the Mediterranean Sea from raw sewage and effluents from the offshore production of natural gas and petroleum. Environmental regulation bodies for Spain include the Ministry of the Environment, the Ministry of Labor and Social Matters, and the National Institute for Health and Safety at Work. Major environmental laws include Environmental Impact Assessment, Toxic and Dangerous Waste, Notification of New Substances, and General Order on Health and Safety at Work. Most of Spain's environmental agenda and pace were determined by the EU because of the need to implement the ever-growing body of EU environmental legislation (Worldinfozone, 2001§).

Clean-water projects and sewerage treatment projects continue to receive priority status. The availability of funding for remedial action to recover contaminated sites throughout Spain is limited when compared with the needs. Nevertheless, a significant amount of funding by the EU has been committed to recover various sites throughout Spain contaminated by mining, mineral processing, and other activities. Other member countries were also receiving funding for remedial work to correct environmental problems (Environmental Reports, 2001§).

Production

Production exceeded domestic consumption for most nonmetallic minerals, thus leaving surpluses for export. With a few exceptions, mine production continued at about the same level or lower as that of 2000. Of the major metals, production of mined lead increased, and that of mined zinc decreased. Production of copper and silver decreased, and cadmium metal production and iron ore mining ceased altogether. Total refined copper production and secondary lead metal output decreased. Primary aluminum metal production increased. The mercury mines at Almadén continued to produce at levels in accordance with market demand.

Quarried mineral products, particularly quarried stone, accounted for a significant share of the value of all mineral production in Spain. In mineral fuels and related materials, natural gas output and petroleum output remained about the same. Spain's production of crude oil was limited, and the country continued to be a large importer of mineral fuels (table 1).

Trade

Spain's international economic profile has grown appreciably in recent years. Spain is the world's 16th largest exporting country. Principal export markets are the EU, the major Latin American economies, and the United States. The primary sources for Spain's imports are the EU, the United States, the Organization of the Petroleum Exporting Countries (for crude oil), Latin American countries, and Japan. The EU accounts for about 70% of Spain's exports and for about 65% of imports (Australian Department of Foreign Affairs and Trade, 2001§).

Spain has eliminated tariff barriers for imports from other EU countries and applies common EU external tariffs to imports from non-EU countries. Similarly, Spain follows the United States-EU mutual recognition agreements in its application of nontariff regulations and conformity assessment procedures applied to certain goods from the United States (U.S. Department of State, 2001).

Spain's exports to and imports from the United States decreased by about 9% in 2001, which resulted in a trade balance of $559 million (tables 2, 3).

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[1] References that include a section twist (§) are found in the Internet References Cited section.

Structure of the Mineral Industry

The mineral industry comprised a mix of state, state and privately owned, and privately owned companies (table 4). Minerals belong to the state under an arrangement known as the Regalía Principal. The Mining Law of July 21, 1973, and the Hydrocarbon Law of October 7, 1998, govern the mineral industry. The General Directorate of Energy Policy and Mines, which is under the Ministry of Economy, implements these mineral laws. Sociedad Estatal de Participaciones Industriales (SEPI) and the Instituto Geológico y Minero are the principal Government mineral-resource agencies. Also, some of Spain's regional governments, such as Andulusia, Asturias, and Catalonia, have interests in the development of mineral resources in their territory.

Commodity Review

Metals

Alumina and Aluminum.—Alumina and primary aluminum were produced almost entirely by Alcoa Inespal S.A. Alcoa was a holding company with three primary aluminum plants and three flat-rolled sheet and extrusions plants. Alúmina Española S.A. (a subsidiary of Alcoa located near San Ciprián) was Alcoa's only European producer of alumina and alumina hydrates; the company was also a producer of primary aluminum in standard sheets and special aluminum alloys.

From January to September 2000 (the latest date for which data were available), Spanish imports of aluminum waste and scrap rose to 39,923 metric tons (t) compared with 38,229 t during the same period in 1999. The United States which was the principal supplier, provided 30,637 t. Spanish export of aluminum scrap totaled 26,096 t from January to September 2000 compared with 12,826 t during the same period 1999 (Metal Bulletin, 2001g).

Copper.—MK Gold Co. was continuing efforts to permit its Las Cruces copper mining project, which is located in southwestern Spain. Bechtel International Inc. completed the feasibility study in March 2001. On the basis of the feasibility study, MK Gold estimated that the capital costs to bring the project into commercial production would be about $290 million; this would include working capital, land purchases and contingencies but exclude interest and other financing costs. A mining concession application was submitted in March 2001. Water permit applications were submitted in April and May 2001 (MK Gold Co., 2001§).

The Las Cruces project will be an open pit mine that will exploit estimated reserves of about 16 million metric tons (Mt) at a grade of 5.94% copper. An average of 1.2 Mt will be mined and processed annually for more than 13 years; this will result in a projected total production of 834,000 t of cathode copper. The plant could produce 72,000 metric tons per year (t/yr), although production was expected to average 63,000 t/yr during the life of the mine (Northern Miner, 2001a).

Navan Resources Ltd.'s Aguas Teñidas copper-lead-zinc operations near Huelva were suspended in December, and a creditor protection application, which is similar to a Chapter 11 bankruptcy in the United States, was filed with the Spanish courts. At that time, Navan's shares were suspended from trading on the Dublin, Ireland, and London, United Kingdom, Stock Exchanges. Navan was believed to be considering options for repayment of about $35 million in loans extended by the Deutsche Bank of Germany, which was used to finance capital expansion programs at Navan's Spanish operations. Navan recorded a $21 million net operating loss for 2001 compared with a $5.5 million loss in 2000. The loss included a full writedown of the company's Spanish assets, which included Aguas Teñidas (Mining Journal, 2001b).

Atlantic Copper S.A. was reported to be considering plans to raise its cathode production by 22% to 320,000 t/yr, its copper rod production by 64% to 240,000 t/yr, and its copper wire output by 212% to 50,000 t/yr. The expansion possibilities were to increase the output of value-added, finished products (Metal Bulletin, 2001c).

Ferroalloys.—Ferroatlántica S.A. was the only producer of ferroalloys in Spain. The group has four sites located in Boo, Dumbia, Monzon, and Sabon. Ferroatlántica announced that it was building a 30,000-t/yr ferrosilicon plant at Dumbria at a cost of about $20 million. Also, the company was planning to expand production of ferromanganese and ferrosilicon at the Boo plant. The plant produces about 140,000 t/yr of ferromanganese, silicomanganese, and ferrosilicon (Metal Bulletin, 2001d).

Between January and March 2001, Spanish imports of ferroalloys were 112,572 t compared with 91,161 t in the corresponding period in 2000. During the same period, exports of ferroalloys were 26,757 t compared with 13,573 t in 2000. The main export destination was the United States, which took 20,912 t of ferrosilicon between January and March 2001 compared with 12,630 t the same period in 2000 (Metal Bulletin, 2001e).

Gold.—Rio Narcea Gold Mines Ltd. was a mineral-resource company with operations, development projects, and exploration activities in Spain and Portugal. Rio Narcea produced gold at its El Valle and Carlés Mines and was proceeding with permitting the Corcoesto gold project. Rio Narcea achieved record output of 3,371 kilograms (kg) of gold in 2001; this was a 28% increase compared with that of 2000. El Valle Mine experienced some lower production caused by complex ore with higher-than-expected levels of impurities. Rio Narcea estimated that production in 2002 would be 4950 kg; this would reflect the development of a high-grade ore zone at El Valle Mine (Mining Journal, 2001d).

Iron Ore.—A principal producer of iron ore was Compañia Andaluza de Minas S.A. (CAM), which had worked its open pit mine at Alquife (Granada). Mining was halted in October 1996, and resumed and halted a couple of times until the mine was placed on care and maintenance in 2000. The very small amount of iron ore that was produced was for nonmetallic applications. CAM remained inactive at yearend 2001.

Mercury.—The Spanish Government transferred its ownership of Minas de Almadén y Arrayanes S.A. (Almadén) in preparation for privatization. Almadén was put under the umbrella of SEPI along with 10 other companies. Any sale would likely be some time in the future. Almadén was the world's largest mercury producer (Metal Bulletin, 2001f).

Nickel.—Rio Narcea exercised an option to acquire the Aquablanca nickel, copper, and platinum-group-metals project in Extremadura province. Rio Narcea acquired the project from Atlantic Copper S.A. and the Spanish Government after reviewing available data and performing testing, drilling and geotechnical studies. The mine plan was based on a 10- to 12-year open pit operation that would produce 10,000 t/yr of nickel in concentrate, which would constitute about one-half of the EU's nickel mine production; copper and platinum-group metals would be produced as byproducts. The company planned to carry out a deep drilling program scheduled for completion in early 2002 that would support a bankable feasibility study. If results are positive, then production could begin in 2004. The work program and feasibility study would be funded by a $4 million debenture arranged with the Deutsche Bank (Northern Miner, 2001b).

The Aquablanca deposit is hosted by mafic cumulates in the Aguablanca stock, which is one of two main intrusions of the Santa Olalla plutonic complex. Mineralization occurs as two elongated subvertical bodies; one contains massive sulfide mineralization, and the other, disseminated sulfides. Sulfides are mainly chalcopyrite, pentlandite, pyrite, and pyrrotite. Reserves were estimated to be 35 to 40 Mt at 0.6% to 0.7% nickel, 0.5% to 0.6% copper, 0.02% cobalt, 0.3 gram per metric ton (g/t) palladium, 0.3 g/t platinum, and 0.15 g/t gold (Mining Journal, 2001c).

Steel.—Spain's largest steelmaker Aceralia S.A. of Spain, Acieries Reunies de Burbach-Eich-Dudelang (ARBED) of Luxembourg, and Usinor Group of France have agreed to merge their businesses and specialities. When the new company is created, the partners will make up the world's largest steel group. It will have the capacity to produce 46 million metric tons per year (Mt/yr) of liquid steel per year, which corresponds to a sales volume of about $30 billion. Aceralia, ARBED, and Usinor will form a multispecialty group, and the merger would furnish them the means to be stronger in Europe and to develop more rapidly outside of Europe. The new group emerging from the integration will focus its activities on the following sectors: flat carbon steel products, long carbon steel products, stainless steel products, and distribution, processing, and trading. The European Commission (EC) gave permission for the integration in November 2001 (Arcelor, 2001§).

Aceralia will double the steelmaking capacity at Bilbao to 1.8 Mt/yr. The new capacity was scheduled to come onstream in early 2003 with the completion of a second Compact Strip Production (CSP) caster and expanded hot strip mill. SMS Demag of Germany was given the CSP order, which included an equalizing furnace, a seventh stand for the hot mill, and other modernization work. The work was expected to be completed by mid-2003. The mill's two electric arc furnaces have been expanded to double their original 900,000-t/yr capacities (Metal Bulletin, 2001b). Aceralia has other steel plants at Avilés, Gijón, and Zaragosa.

Aceralia was also planning to increase the capacity of its rail mill at the Gijón works. The upgrade would increase the mills capacity to more than 200,000 t/yr from 130,000 t/yr. The rail mill suppled rail for Spain's high-speed train network and also exported rail material to Brazil and Taiwan. In 2000, the company delivered rail lengths of 288 meters to the domestic market (Metal Bulletin, 2001a).

Acerinox S.A. may move some of its production away from Spain to its newly acquired stainless steel plant, Columbus Stainless, in Middelburg, South Africa, owing to high electricity costs in Spain. Acerinox complained that Spain has become a high-cost country as far as power was concerned. In addition, the Algeciras works had six power cuts in 2001 that totaled 26 hours. The company said its electricity costs in South Africa were less than one-half of those in Spain. Slabs produced at Columbus could be sent to Acerinox's other works for rolling (Metal Bulletin, 2002a).

A shake-out of the motor vehicle dismantling and scrap industry was predicted as new rules were introduced for reclaiming material from end-of-life vehicles (ELVs). Industry groups wanted to establish a joint strategy and an integrated system to raise the quantity of materials and spare parts reclaimed from ELVs to meet national recycling targets of 85% by weight in 2006 and 95% by weight by 2015. Between 2002 and 2006, ELVs in Spain could supply 600,000 t of scrap metal and from 130,000 t to 150,000 t of other materials (Metal Bulletin, 2002b).

Tantalum and Tin.—Solid Resources Ltd. formed a subsidiary to hold a 60% interest in a tantalum mining venture. Solid Resources acquired 20,500 acres, which covered a number of small former tin mines. Tantalum is often found in conjunction with tin. On the basis of 18 bulk samples collected in a continuous zone by Instituto Geológico y Minero of Spain, 3.5 Mt of ore with an average grade of about 1 kg of tin per metric ton and about 0.1 kg of tantalum per metric ton was estimated to occur in one of the Coto Tocayas deposits. Lithium and niobium were also reported (Solid Resources Ltd., 2001§).

Tungsten.—The Austrian integrated tungsten producer Wolfram Bergbau und Hutten GmbH signed a contract to begin scheelite mining in the Castila y Leon region of Spain. Ore reserves were estimated to be more than 2 Mt with a higher than 0.7% WO_3 content. According to the company's plan, the mine would operate for 4 years as an open pit mine and then be developed as an underground operation. Production was scheduled to be about 800 t/yr of tungsten-in-concentrate. The scheelite concentrate was to be delivered to Wolfram's plant in Bergla, Austria (Metal Bulletin, 2001i).

Zinc.—Boliden Apirsa S.A.'s Los Frailes Mine, which was one of the biggest open pit zinc mines in Europe, was closed in early 1998 after a costly tailings dam accident. Mining operations started in mid-1999 after the license and a permit to dump tailings in the Aznalcóllar open pit were granted. The result of a judicial investigation in 2001 indicated that the accident was caused by mistakes in the design of the dam and erroneous conclusions of the geologic studies carried out prior to construction and could not be attributed to Boliden Ltd. or Boliden Apirsa (its subsidiary and the operating company) at Los Frailes (Mining Journal, 2001a).

In keeping with an asset-sale and restructuring program, Boliden and Trafigura AG of Switzerland signed an agreement to negotiate the sale of Los Frailes Mine. Boliden reported an operating loss of $656 million, which included a writedown of $210 million for its investment in Los Frailes. Boliden Apirsa closed Los Frailes Mine in October 2001. Trafigura and Murchison United Ltd. of Australia were the only two parties that expressed an interest in Los Frailes. Trafigura also expressed interested in the forthcoming sale of Minas de Rio Tinto S.A. (Metal Bulletin, 2001h).

Xstrata AG of Switzerland made a takeover offer of $520 million for Asturiana de Zinc S.A. (Azsa). Xstrata made the takeover offer conditionally upon the receipt of at least 80% of Azsa's shares. Xstrata was basing its zinc strategy on being a low-cost producer and having control of the cash flow through 100% acquisition. A capacity expansion project that was completed in 2001 raised the capacity of Azsa's San Juan de Nieva smelter and refinery to 460,000 t/yr from 320,000 t/yr. This expansion made Azsa the largest zinc smelter in Europe (Metal Bulletin, 2001j).

Industrial Minerals

Clays.—Spain maintained its world leadership in sepiolite production and held 70% of the world's reserves, which are located mostly around Madrid. The largest deposit was thought to be in excess of 15 Mt. High freight costs have, however, reduced profitability, so speciality clay producers were tending to concentrate on alternative markets, such as pet litter, foundry, and rheological additives (Grupo Tolsa, 2000§).

Magnesium Compounds.—Grecian Magnesite S.A., which was one of the world's leading magnesite producers, and Timab Industries have increased their interest in Magnesitas Navarras S.A. (Magna), which was the largest magnesite producer in Spain, to 97.7%. Magna was a specialist magnesia producer with capacities of 125,000 t/yr of caustic and dead burned magnesia and 40,000 t/yr of refractory mixes. The operation consisted of an open pit mine at Eugui and concentrating and calcining facilities at Zubiri (Industrial Minerals, 2001d).

The mine at Eugui in the Occidental Pyrenees has been active for 40 years. Reserves were estimated to be more than 350 Mt. About 360,000 t/yr has been extracted from the mine, of which 20% has been waste. The material is crushed, ground, concentrated, and then fed into one of two kilns depending on the product to be made. One kiln, at a temperature of 1,200° C, produced calcined caustic magnesia with about 1% magnesium carbonate in the material. The other kiln, at a temperature of 1,700° C, produced dead burned magnesia which is 82% to 90% magnesium oxide (Industrial Minerals, 2001b).

Soda Ash.—Solvay S.A., which was the leading sodium carbonate (soda ash) supplier in Europe, stated that it intended to build a new 80,000-t/yr sodium bicarbonate production line at its soda ash plant at Torrelavega. The location, which is close to the port of Santander, provides the possibility of combining sodium bicarbonate exports with high-volume movements of soda ash. The new line will bring the company's total European production of sodium bicarbonate to 450,000 t/yr (Industrial Minerals, 2001c).

Sulfur.—Fertiberia S.A. was continuing with the construction of the largest sulfuric acid plant in Europe. The plant, which was located at Huelva, was being built by Lurgi Group of Germany at an estimated cost of about $28 million. Fertiberia used sulfuric acid to make fertilizers (Industrial Minerals, 2001a).

Mineral Fuels

Spain's largest energy utility Endesa S.A. planned to build five new powerplants from 2001 through 2005; total installed capacity will be 1,823 megawatts (MW). The construction of the plants will help offset the loss of 2,600 MW of capacity as a result of the planned sale of its Electrica Viesgo unit. Four of the plants will be built on the mainland—Barcelona, Cadiz, Huelva, and Tarragona; the fifth will be built on the Balearic Islands. By 2007, Endesa expected to have a total of 3,200 MW of installed capacity that uses combined-cycle gas-powered generating technology (Alexander's Gas and Oil Connections, 2001b§).

Spain has partially liberalized its power market and brought forward the date for full competition to 2003, which is 4 years earlier than previously scheduled Spain's competition court recommended approval of the merger of electric companies Endesa and Spain's second largest energy utility Iberedrola S.A. under strict conditions. The two companies controled 80% of Spain's power distribution. The new company could not have more than the 41% market share held by Endesa in 2000 (Alexander's Gas and Oil Connections, 2001c§).

Repsol YPF S.A. had formerly requested the competition tribunal to rule against the proposed merger of Endesa and Iberdrola. Repsol stated that the $14.3 billion merger should be blocked because it would create a de facto electricity monopoly. The prospects of having to meet stringent antitrust conditions by significant disposals of subsidiaries have prompted Endesa and Iberdrola to express concern that the link-up may not be viable (Burns, 2001).

Coal.—Spain, which was one of the larger coal producers in the EU, had an output of almost 23 Mt in all types of coal in 2001. Coal reserves were abundant but difficult to mine. Consequently, the cost of production was high, which made Spanish coal less competitive than that of many other countries. The leading producer of bituminous coal was Huelleras del Norte S.A., and the leading producer of lignite was Empresa Nacional de Electricidad S.A.

The EU required that mining subsidies be phased out; it can, however, authorize payments where aid can be shown to be assisting in the restructuring of an industry that might falter without public money. Although coal was Spain's most plentiful indigenous energy source, it was too expensive to extract to be competitive in a free-energy market. The EC accepted the particular problems that faced the coal sector and consequently allowed the financing of some operational aid as well as structural reforms. The EC authorized the Government to grant aid of up to about $1 billion in 2001. The EC authorized operating aid of $275 million for 42 mines that collectively produced 10.7 Mt/yr; structural aid of $350 million for rationalizing 14 mines that collectively produced 3.2 Mt/yr; welfare payments of $358 million for around 13,000 workers who were taking early retirement; and special technical grants of $87 million to cover one-off costs of closing mines (Mining Journal, 2002).

Natural Gas.—Compañia Española de Petróleos S.A. (Cepsa) reported that the EC had cleared the merger of Cepsa Gas Commercializadora and TotalFinaElf Gas and Power España. The merger of the two companies natural gas operations was approved under the EC's simplified procedure which clears uncontroversial mergers or joint ventures automatically after 1 month if no objections are raised by third parties. Cepsa Gas will adsorb 100% of TotalFinaElf Gas and Power and TotalFinaElf will buy 50% of Cepsa Gas (Alexander's Gas and Oil Connections, 2001a§).

Petroleum.—Repsol YPF S.A. discovered two new crude oil reservoirs offshore southern Spain in the Mediterranean Sea. The discoveries, named Necora 1 and Bocarte 1, will provide flows of up to 5,000 barrels per day (bbl/d) oil and mark another successful stage in the company's Tridente exploration program. The largest well in the area, Chipiron, was flowing 4,000 bbl/d of oil. The discoveries were expected to be tied back 11 kilometers to the Casablanca platform, which was producing 7,500 bbl/d of oil from the Baracuda, Boqueron, Casablanca, Chipiron, and Rodaballo fields (Cross, 2001).

Renewable Energy.—Spain has distinguished itself as a world leader in the use of different types of renewable energy. The country placed strong emphasis on hydroelectricity and had plans for 150 wind farms to add to its existing total. Spain was the world's third largest generator of renewable energy after Germany and the United States and had already reached the standards set by the EU that required that 12% of each member country's electricity to be derived from alternate energies by 2012. Iberdrola generated 41% of its product from renewable sources, mainly hydropower (Alexander's Gas and Oil Connections, 2001a§).

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Major Sources of Information

Instituto Geológico y Minero
Rio Rosas, 23
28003 Madrid, Spain

General Directorate of Energy Policy and Mines
Doctor Fleming, 7
28036 Madrid, Spain

TABLE 1
SPAIN: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1997	1998	1999	2,000	2001 e/
METALS						
Aluminum:						
Alumina 2/		1,110,300	1,100,000	1,100,000 e/	1,200,000 e/	1,100,000
Metal:						
Primary		359,904	361,900	363,900	365,700	376,400 3/
Secondary		153,800	154,000	224,000	240,520	221,720 3/
Cadmium metal		301	196	--	--	--
Copper:						
Mine output, Cu content		37,833	37,002 r/	1,738 r/	23,312	9,700
Metal:						
Blister:						
Primary		288,900	304,330	292,800 r/	289,900	279,900 3/
Secondary e/		23,800	30,000	25,000 r/	25,000	24,700 3/
Total		312,700	334,330	317,800 r/	314,900	304,600 3/
Refined:						
Primary		229,000	239,600	250,756	258,000	235,100 3/
Secondary e/		63,300	64,700	65,000	58,000	55,600 3/
Total		292,000 e/	304,330	315,756	316,000	290,700 3/
Germanium oxide, Ge content e/	kilograms	6,500 3/	6,500	6,000	6,000	6,000
Gold, mine output, Au content	do.	1,824	3,295	5,018	4,310	3,720 3/
Iron and steel:						
Iron ore and concentrates, Fe content	thousand tons	58	--	--	--	--
Metal:						
Pig iron	do.	3,926	4,235	4,146	4,059	4,094 3/
Ferroalloys, electric furnace	do.	208 r/	190 r/ e/	179 r/	180 r/	180
Ferrochromium, crushed e/		1,000	1,000	1,000	950 3/	--
Steel, crude	thousand tons	13,644	14,827	14,886	15,844	15,834 3/
Steel, hot rolled	do.	12,421	13,259	13,846	14,599	14,931 3/
Lead:						
Mine output, Pb content		23,900	21,900 r/	41,800 r/	40,300 r/	49,500 3/
Metal, secondary e/		74,900	90,000	96,000	120,000	121,600 3/
Mercury, metal	thousand tons	4	7	4	9	8 3/
Silver, mine output, Ag content	kilograms	66,000	47,000	96,000	83,000 r/	60,000
Tin, mine output, Sn content e/		2,000	2,000	2,000	1,819 r/	708 3/
Titanium dioxide e/		18,000	16,000	16,000	-- r/	-- 3/
Uranium, mine output, U_3O_8 content	thousand tons	425	335	362	623	645 3/
Zinc:						
Mine output, Zn content		171,800	128,100	154,062 r/	201,300 r/	164,900 3/
Metal, primary and secondary		364,200	358,300	393,000 r/	387,100 r/	436,800 3/
INDUSTRIAL MINERALS						
Barite, $BaSO_4$		90,000	70,000	62,000	32,653 r/	44,000
Bromine e/		100	100	100	--	--
Calcium carbonate e/		1,750	1,880	1,950	2,000	2,000
Cement, hydraulic, other than natural	thousand tons	27,632	27,943	35,830 r/	38,154 r/	40,512 3/
Clays:						
Attapulgite e/		125,000	130,000	130,000	28,307	24,477 3/
Bentonite e/		170,000	193,000 3/	190,000	90,152	90,000
Kaolin, washed		296,000	310,000	320,000	353,355	400,000
Other e/	thousand tons	20,000	20,000	15,000	15,000	15,000
Diatomite and tripoli e/		36,000	56,000	55,000	66,770 r/	57,000
Feldspar		398,000	430,000	450,000	478,260 r/	600,000
Fluorspar, CaF_2 content						
Acid-grade		110,000 e/	110,000 e/	133,000	132,690 r/	126,535 3/
Metallurgical-grade		10,000 e/	14,000 e/	9,000	7,776 r/	7,504 3/
Total		120,000 e/	124,000 e/	142,000	140,466 r/	134,039 3/
Gypsum and anhydrite, crude	thousand tons	8,300	7,500	9,450	9,929 r/	10,900
Kyanite, andalusite, related materials e/		2,500 3/	2,500	2,500	-- r/	--
Lime, hydrated and quicklime e/	thousand tons	1,500	1,500	1,500	1,500	1,500
Magnesite, calcined		171,000	201,000	211,000	160,000 r/	156.000 3/
Mica e/		2,500 3/	2,500	2,500	10,086 r/	10,000
Nitrogen, N content of ammonia	thousand tons	497	460 e/	437	442	436 3/

See footnotes at end of table.

TABLE 1--Continued
SPAIN: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1997	1998	1999	2000	2001 e/
INDUSTRIAL MINERALS--Continued						
Pigments, mineral: e/						
Ocher	thousand tons	80	70	70	87 3/	87
Red iron oxide		15,000	15,000	15,000	-- r/	-- 3/
Potash, K_2O equivalent		639,000	597,000	549,000 r/	646,294 r/	569,127 3/
Pumice e/		600,000	600,000	600,000	761,540 3/	770,000
Pyrite, including cuprous, gross weight	thousand tons	993	868	733	205 r/	152 3/
Salt:						
Rock, including byproduct from potash works	do.	2,200 e/	2,200	2,200	2,328 r/	2,500
Marine and other	do.	1,400 e/	1,200	1,400	1,541 r/	1,600
Sand and gravel, silica sand e/ 4/	do.	58,000	62,000	65,000	86,321 r/	95,000
Sepiolite, meerschaum		695,000	750,000	800,000	794,114 r/	896,983 3/
Sodium compounds, n.e.s.:						
Soda ash, manufactured e/	thousand tons	500	500	500	500	500
Sulfate, natural: e/						
Glauberite, Na_2SO_4 content		650,000	650,000	675,000	669,256 3/	705,000
Thenardite, Na_2SO_4 content		180,000	180,000	200,000 3/	167,800 3/	168,000
Manufactured		125,000	125,000	125,000	125,000	125,000
Stone: e/						
Chalk	thousand tons	140	136	136	889 3/	980
Dolomite	do.	5,400	5,000	9,080	8,752 3/	9,628 3/
Limestone	do.	2,500	2,200	2,200	193,450 3/	2,500
Marble, ornamental	do.	2,400	2,400	3,850	3,687 3/	4,100
Marl	do.	8,950	9,845 3/	10,030	9,966 3/	10,495 3/
Basalt	do.	1,400	1,000	1,000	3,044 3/	3,348 3/
Granite, ornamental	do.	1,400	1,400	1,750	1,188 3/	1,200
Ophite	do.	2,200	2,000	2,000	2,579 3/	2,840 3/
Phonolite	do.	650	650	650	1,479 3/	1,630 3/
Porphyry	do.	800	1,000	1,000	2,159 3/	2,483 3/
Quartz	do.	1,520	1,500	1,720	1,961 3/	2,150 3/
Quartzite	do.	2,400	2,000	2,200	2,131 3/	2,150 3/
Sandstone	do.	2,500	2,500	2,500	2,318 3/	2,430 3/
Serpentine	do.	900	1,000	1,000	794 3/	897 3/
Slate	do.	555	615 3/	600	751 3/	790
Other	do.	1,000	1,000	1,000	1,000	1,000
Strontium minerals, Sr_2O_4 content		92,000 e/	111,000	128,000 r/	148,352 r/	143,320 3/
Sulfur:						
S content of pyrites	thousand tons	480	430	388	94 r/	71 3/
Byproduct: e/						
Of metallurgy	do.	250	461	455	454	461 3/
Of petroleum	do.	150	100	110	115	135 3/
Of coal (lignite) gasification	do.	2	1	1	1	1
Total sulfur	do.	882	992	954	708 r/	667 3/
Talc and steatite e/		110,000	110,000	111,000 3/	114,654 r/	115,000
MINERAL FUELS AND RELATED MATERIALS						
Coal (marketable):						
Anthracite	thousand tons	6,678	6,393	5,436	4,651	4,694 3/
Bituminous	do.	7,200 e/	6,004	6,828	6,173	5,797 3/
Lignite (black and brown)	do.	12,577	13,675	12,535	12,153	12,193 3/
Total	do.	26,455	26,072	24,253	23,485	22,684 3/
Coke, metallurgical	do.	2,622	2,649	2,332	2,470	2,400
Gas, natural (marketed)	million cubic meters	178	114	143	179	180
Peat e/		60,000	50,000	50,000	50,000	50,000
Petroleum:						
Crude	thousand 42-gallon barrels	2,850	4,013	2,295	1,648 r/	2,505 3/
Refinery products:						
Liquefied petroleum gas	do.	18,954	18,096	18,000	18,000 e/	18,000
Naphtha	do.	22,899	24,990	25,000	25,000 e/	2,500
Gasoline, motor	do.	78,497	84,405	85,000	85,000 e/	85,000
Jet fuel	do.	33,000	36,000	36,000	36,000 e/	36,000
Kerosene	do.	20,000	30,000	30,000	30,000 e/	30,000
Distillate fuel oil	do.	138,249	148,969	150,000	150,000 e/	150,000

See footnotes at end of table.

TABLE 1--Continued
SPAIN: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1997	1998	1999	2000	2001 e/
MINERAL FUELS AND RELATED MATERIALS--Continued						
Petroleum--Continued:						
Refinery products--Continued:						
Residual fuel oil	thousand 42-gallon barrels	77,276	86,407	85,000	85,000 e/	85,000
Other e/	do.	35,500	37,400	38,000	38,000	38,000
Refinery fuel and losses e/	do.	12,000	10,000	10,000	10,000	10,000
Total e/	do.	436,000	476,000	477,000	477,000	477,000

e/ Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. r/ Revised. -- Zero.

1/ Table includes data available through June 2002.

2/ Reflects aluminum hydrate.

3/ Reported figure.

4/ Includes sand obtained as a byproduct of feldspar and kaolin production.

TABLE 2
SPAIN: EXPORT AND IMPORT TRADE WITH THE UNITED STATES IN 2001

(Million dollars)

Month	Exports	Imports
January	459	542
February	530	417
March	617	425
April	420	436
May	491	476
June	505	454
July	314	414
August	428	433
September	489	359
October	525	426
November	522	422
December	455	394
Total	5,756	5,197

Source: U.S. Census Bureau, Foreign Trade Division, July 2002.

TABLE 3
SPAIN: TRADE BALANCE WITH THE UNITED STATES

(Million dollars)

Year	Exports	Imports	Trade balance
1997	5,539	4,606	933
1998	5,454	4,780	673
1999	6,133	5,059	1,074
2000	6,322	5,713	609
2001	5,756	5,197	559

Source: U.S. Census Bureau, Foreign Trade Division, July 2002.

TABLE 4
SPAIN: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Alumina	Alumina Española S.A. (Alcoa Inespal S.A.)	Alumina plant at San Ciprián, Lugo	1,000
Aluminum	Aluminio Español S.A. (Alcoa Inespal S.A.)	Electrolytic plant at San Ciprián, Lugo	180
Do.	Industria Española del Aluminio, S.A. (Alcoa Inespal)	Electrolytic plant at Avilés	100
Do.	do.	Electorlytic plant at La Coruña	25
Barite	Minas de Baritina S.A. (Kali-Chemie of Germany, 100%)	Mine and plant in Espiel area, Córdoba	50
Bentonite	Tolsa S.A.	Mine and plant at Vicalvaro, near Madrid	200
Cement	Approximately 36 cement companies, the largest of which was:	54 plants, including:	44,000
Do.	Asland S.A.	Five plants, of which the largest ones are:	(6,000)
Do.	do.	Plant at Puerto de Sagunto, Valencia,	(2,000)
Do.	do.	Plant at Villaluenga de la Sagra, Toledo	(2,000)
Coal:			
Anthracite	Antracitas Gaiztarro S.A.	Mines at María and Paulina	2,000
Do.	Antracitas de Gillón S.A.	Mines near Oviedo	2,000
Do.	Antracitas del Bierzo S.A.	Mines near León	1,000
Bituminous	Hulleras del Norte S.A. (Hunosa)	Various mines and plant	3,300
Do.	Hulleras Vasco Leonesa S.A.	Santa Lucia Mine, Leon	2,000
Do.	Minas de Figaredo S.A.	Mines near Oviedo	1,000
Do.	Nacional de Carbon del Sur (Encasur)	Rampa 3 and San Jose Mines, Cordoba	200
Lignite	Empresa Nacional de Electricidad S.A. (Endesa)	As Pontes Mine, and Andorra Mine, La Coroña	15,000
Copper:			
Metal	Atlantic Copper S.A. (Freeport MacMoRan Inc., 65%; Ercros Group, 35%)	Electrolytic refinery at Huelva	290
Do.	do.	Smelter at Huelva	270
Do.	Elmet SL	Electrolytic refinery at Berango	36
Do.	do.	Smelter at Berango	24
Ore, metal content	Atlantic Copper S.A. (Freeport MacMoRan Inc., 65%; Ercros Group, 35%)	Mines and plant at Arientero, near Santiago de Compostela, Corta Atalay open-pit mine, and Cerro Colorado open-pit mine in Rio Tinto area	12
Do.	do.	Alfredo underground mine in Rio Tinto area	30
Do.	Navan Resources Ltd.	Sotiel area	6
Dunite	Pasek España S.A.	Mines and plant at Landoy, Ortigueira	1,500
Ferroalloys	Ferroatlantica S.A.	Plants at Boo, Dumbria, Monzon, and Sabon	200
Fluorspar, ore	Fluoruros S.A. (Bethelhem Steel Corp., 49%)	Plant at Caravia, near Colunga	400
Do.	do.	Opencast mines in Asturias at San Lino and Val Negro and underground mine at Eduardo, near Carav	350
Do.	do.	Plant at Collada, mines at Venros Sur and Corona	200
Gold kilograms	Rio Narcea Gold Mines, Ltd.	Belmonte de Miranda, Asturias	3,750
Iron ore	Compañia Andaluza de Minas S.A. (Mokta Corp., 62%)	Mine at Alquife, Granada (closed; maintenance status)	4,000
Lead:			
Metal	Española del Zinc S.A.	Smelter at Cartagena, Murcia	60
Do.	do.	Refinery at Cartagena, Murcia	60
Do.	Compañia La Cruz, Minas y Fundaciones de Plomo S.A.	Smelter at Lineares, Jaén	40
Do.	do.	Refinery at Lineares, Jaén	40
Do.	Tudor S.A.	Secondary smelter at Zaragoza	16
Do.	Ferroaleaciones Españolas, S.A.	Secondary smelter at Medina del Campo	12
Do	Derivados de Minerales y Metales	Secondary smelter at Barcelona	5
Ore	Andaluza de Piritas S.A. (APIRSA)	Opencast mine at Aznalcóllar, Sevilla	21
Do.	Exploración Minera International España S.A. (EXMINESA)	Underground mine at Rubiales, Lugo	16
Limestone	Calcinor S.A.	Mines at Aizkibel, Calcasa, Dobusa and Tolosa	2,500
Magnesite	Magnesitas Navarras S.A. (Grecian Magnesite S.A., 99.7%)	Mine at Eugui, Plant at Zubiri	125
Do.	Magnesitas de Rubián S.A.	Mine and plant near Sarria, south of Lugo	75
Mercury flasks	Minas de Almadén y Arrayanes S.A, (Sociedad Estatal de Participaciones Industriales, 100%)	Mines and smelter at Almadén	70,000
Nitrogen, N content of ammonia	Fertiberia S.A.	Plant at Frontera	415
Petroleum:			
Crude barrels per day	Chevron S.A.	Oilfield at Casablanca	300

TABLE 4--Continued
SPAIN: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Petroleum--Continued:			
Refined barrels per day	Repsol YPF S.A.	Refineries at Escombreras	200,000
Do. do.	do.	Puertollano	14,000
Do. do.	do.	Tarragona	260,000
Do. do.	Refineria de Petróleos del Norte S.A. (Petronor)	Refinery at Somorrostro	240,000
Do. do.	Compañía Española de Petróleos S.A. (Cepsa)	Refinery at Santa Cruz de Tenerife	160,000
Do. do.	Petroleos del Mediterraneo S.A. (Petromed)	Refinery at Castellón de la Plana	120,000
Do. do.	Compañía Iberica Refinadora de Petróleos S.A. (Petroliber)	Refinery at La Coruña	140,000
Potash, ore	Iberpotash S.A. (Dead Sea Works Ltd., 60%; La Seda S.A., 20%; Tolsa S.A., 20%)	Mines and plants at Suria, near Barcelona	850
Pyrite	Compañia Española de Mines de Tharsis	Mines and plants at Tharsis and Zarza, near Seville	1,300
Do.	do.	Plant at Huelva	600
Do.	Rio Tinto Minera S.A. (Rio Tinto plc, 75%; Rio Tinto Zinc, 25%)	Mines and plant at Rio Tinto, near Seville	900
Sepiolite	Tolsa S.A.	Mine and plant at Vicalvaro, near Madrid	600
Do.	Minería y Technologia de Arcillas S.A.	Mine and plant at Zaragosa	125
Sodium bicarbonate	Solvay S.A.	Plant at Torrelavega	80
Sodium sulfate, natural	Crimidesa S.A.	Mine and plant at Cerezo de Rio, Burgos	600
Do.	Minera de Santa Marta S.A.	Mine and plant at Belorado, Burgos	250
Steel	Aceralia S.A.	Plants at Avilés, Bilboa, Gijon, Sagunto, and Sestao	8,000
Do.	Celsa Group	Plant at Barcelona	2,600
Do.	Acerinox S.A.	Plants at Algeciras and Palmonos	1,000
Strontium	Solvay Minerales S.A.	Mines and plant at Escuzar, Granada	85
Do.	Canteras Industriales S.A.	Mine and plant at Montevives, Granada	50
Uranium, U_3O_8 metric tons	Empresa Nacional del Uranio (Enusa) (Government, 100%)	Mines and plant near Ciudad Real	500
Zinc:			
Metal	Asturiana de Zinc S.A, (Xstrata AG)	Electrolytic zinc plant at San Juan de Nieva	460
Do.	Española del Zinc S.A.	Electrolytic zinc plant at Cartagena	68
Ore	Asturiana de Zinc S.A, (Xstrata AG)	Reocin mines and plants near Torrelavega, Santander	500
Do.	Boliden Apirsa S.A. (Boliden Ltd., 100%)	Los Frailes Mine at Aznalcóllar	3,500
Do.	Exploración Minera International España S.A. (EXMINE S.A.)	Underground mine at Rubiales, Lugo	500

THE MINERAL INDUSTRY OF

SWEDEN

By Chin S. Kuo

Sweden is an industrialized country endowed with such natural resources as extensive forests, rich iron ore deposits, and abundant hydroelectric power. Its economy slackened during the first half of 2001 with an overall growth in gross domestic product (GDP) of 1.4%. Swedish industry, which included metal products manufacturing, contributed 27.9% of GDP. The per capita income for the country was $26,200. The inflation rate was low and steady at 2.6% (U.S. Department of State, 2002§[1]). The Government budget improved to a surplus of 8% of GDP in 2001. Besides iron ore, other significant mineral resources were base metals (copper, lead, and zinc) and industrial minerals (dolomite, feldspar, granite, kaolin, limestone, and quartz).

Poplar Resources Ltd. of Canada investigated the Bottenbacken polymetallic-palladium property. Geophysical surveys were completed, and drilling was expected to begin in August. Dragon Mining NL of Australia completed a bankable feasibility study of its 60% owned Svartliden gold deposit, which is 70 kilometers from Lycksele in the Skelleftea district. Lappland Goldminers AB was investigating gold mineralization at the Faboliden and the Stortjarnshobben prospects in the vicinity of Lycksele (Mining Journal, 2001c).

Outokumpu Steel Oyj and Avesta Sheffield AB merged to form AvestaPolarit Oyj Abp. The company planned to close its Degerfors melting shop and billet-rolling operation by 2003. The plant's production capacity for blooms and billets was 200,000 metric tons per year (t/yr). About 330 out of Degerfors' 700 employees would be laid off in the closure. Degerfors would continue rolling and finishing of stainless quarto plate (Metal Bulletin, 2001j). In the third quarter of 2001, output at the Degerfors meltshop was reduced. Production at the Steckel mill at Avesta also was trimmed because of operating problems.

Billiton Development Far East BV and Billiton Arctic Resources BV entered into an alliance with Lake Resources NL of Australia to explore for iron-oxide-hosted copper/gold and hybrid zinc/lead/silver base-metal deposits in granted tenements in the Norbotten district of northern Sweden. The majority of the planned $500,000 would be used to explore the Klingersel and Tjamotis tenements. On completion of initial scout drilling on the tenements, Billiton Development and Billiton Arctic might begin a joint venture to earn a 51% interest in the project by funding $1.4 million of exploration expenditure and earn an additional 19% by a further $2.2 million for exploration. After that, Lake could decide to participate at 30% to be diluted to a 10% interest loan carried to production or to receive a 3.5% cash operating royalty (Billiton Plc, 2001).

Boliden Metals AB's Rönnskär smelter near Skelleftea in northern Sweden processed imported concentrates and those supplied from its own mines. It produced primarily copper, gold, lead, silver, and zinc concentrate, which was sold as feed to the Norzink A/S refinery in Norway. A $1.9 billion expansion program to increase copper capacity by 70% to 240,000 t/yr was completed, and output reached 94% of rated capacity of 240,000 t/yr in April. The smelter derived 50% of its copper concentrates from the Aitik Mine and the rest from Chile and Indonesia. Boliden Metals' base-metal mines produced gold as a byproduct, and a $9.8 million gold-leaching plant was built at the mill. Production was expected to begin in June 2001 at a rate of 3.2 t/yr (Mining Journal, 2001a).

Svenskt Stal AB (SSAB) was Sweden's largest steel producer. The company planned to build a fifth press- hardening line at its Lulea plant along with some environmental improvement at its Lulea coking operation; press-hardened sheet was used to make bumpers and side impact protection beams for vehicle makers. The investment would total $23 million, and startup was expected in 2002 (Metal Bulletin, 2001g).

SSAB was expanding its quenched plate output with a new four-high rolling mill that would be able to produce thinner plate and with a second quenching line that would increase capacity by 50% to 750,000 t/yr (Metal Bulletin, 2001l). The four-high mill at its Oxelosund subsidiary was out of production for 3 weeks in August after one of the two main motors was damaged. Oxelosund was expected to lose about 300,000 metric tons of heavy plate production during the shutdown. The rolling mill was running at its maximum capacity of 500,000 t/yr (Metal Bulletin, 2001k).

Fundia AB (a long-product subsidiary of Rautaruukki Oy of Finland) started a restructuring program that would cause widespread workforce cuts. Fundia Special Bar, which was an engineering steelmaker in Sweden, was cutting 130 jobs at the Smedjebacken steel works and rolling mill and a further 21 jobs at the Boxholm rolling mill. Fundia Reinforcing also would cut its workforce at Halmstad in Sweden (Metal Bulletin, 2001d).

Ovako Steel AB planned to reduce production from June in the face of weaker demand for steel in the bearing and engineering steel sectors. The company was to cut its workforce by 80 and to reduce steel output by 10% at the Hallefors and the Hofors works. Ovako Steel's normal production capacity was 550,000 t/yr of crude steel, 300,000 t/yr of bars, 110,000 t/yr of tubes, and 25,000 t/yr of rolled rings. The company also planned to operate its melting shop on a reduced shift beginning in June in line with lower production rates at its rolling mills. Ovako Steel was owned by SKF, which was thought to have a 40% share of the European market for bearing steel (Metal Bulletin, 2001f).

Job losses and production cutbacks were planned at Sandvik Specialty Steels. Sandvik Group was expected to cut 2,000 jobs by the end of 2002 because of slower sales. About 1,000 workers would be let go in the tool division, and a similar number, in steel and mining combined. In the first 9 months of 2001, the steel subsidiary cut 400 of the 600 to 700 jobs under a 3-year restructuring program of production and sales in Europe (Metal Bulletin, 2001i).

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[1] A reference that includes a section twist (§) is found in the Internet Reference Cited section.

Rautaruukki acquired Helens Stal AB, which was the Swedish flat-product stockholding and service center company. Helens Stal, which was to continue operating under the name of Asva AB, specialized in the distribution and processing of hot- and cold-rolled and galvanized steel, stainless steel, and aluminum. Helens Stal's parent company was Helens Ror, which was the Swedish tube industry holding group that was owned by Benteler AG of Germany (75%) and Rautaruukki (25%) (Metal Bulletin, 2001h).

Inexa signed a dual distribution agreement with HSP of Germany (a subsidiary of Salzgitter AG) and Beltrame Sidermarghera of Italy to take over the sales and marketing of the two companies' production of shipbuilding profiles, mainly bulb flats. Inexa also produced bulb flats at its works in Lulea in northern Sweden. HSP produced heavier bulb flats primarily for shipbuilders in northwestern Europe, and Beltrame served customers in southern Europe with lighter bulb flats. Other European producers of bulb flats included Corus Group and Rautaruukki Profile (Metal Bulletin, 2001e).

Following Inexa's deal, Duroc was to take over Inexa Profil's rail mill at Lulea; Inexa Profil was a unit of Inexa. The sale hinged on Duroc negotiating a long-term agreement for liquid steel supply from SSAB's integrated steel works also at Lulea. Inexa Profil, which had 300 employees, produced 200,000 t/yr, one-half of which was rails, and the rest, billets, bar rounds, and free-cutting steel. Duroc would continue producing all these products. In return for the mill, Inexa's owner would receive a 9% share in Duroc worth $3.5 million (Metal Bulletin, 2001b). The takeover deal was subsequently called off owing to Duroc's inability to secure a supply contract of liquid steel, and Inexa would continue to operate as before. Duroc, however, planned a second attempt to buy Inexa Profil, which filed for bankruptcy in September. At least two other parties were interested in the takeover (Metal Bulletin, 2001c).

Boliden AB signed a letter of intent to develop the Storliden zinc/copper deposit in the Skellefte mineral district in northern Sweden with North Atlantic Natural Resources AB (NAN), which owned the deposit. The deposit contained 1.8 million metric tons of ore at a grade of 10.3% zinc, 3.43% copper, 0.25 gram per metric ton (g/t) gold, and 24 g/t silver. Boliden would advance $5 million to NAN on account of incurred expenditures. NAN would develop and mine Storliden ore, deliver all ore to Boliden, and be responsible for financing the development. Boliden would finance changes required to be made to its milling facilities to accommodate the Storliden ore. The two companies intended to mine and process between 250,000 and 350,000 t/yr of ore. Commercial production was scheduled for 2002 with a mine life of 6 years (Metal Bulletin, 2001a).

The Storliden deposit is a relatively shallow high-grade massive sulfide mineralization hosted by volcanic metasediments. NAN was an exploration joint venture between South Atlantic Resources Ltd. of Canada (38%) and Boliden Mineral AB (38%); the public held the remaining 24%. Boliden mill's average yield was expected to be 25,000 t/yr of zinc in concentrate and 10,000 t/yr of copper in concentrate. The total capital cost of the mine and the mill modifications was estimated to be $16 million (Mining Journal, 2001b).

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Major Source of Information

Geological Survey of Sweden
Mineral Resources Information Office
Skolgatan 4
93070 Mala, Sweden

TABLE 1
SWEDEN: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1997	1998	1999 e/	2000 e/	2001 e/
METALS						
Aluminum metal:						
Primary		98,377	95,670	99,340 2/	100,800 2/	101,800 2/
Secondary e/		24,000	25,000	25,000	26,000	26,000
Copper:						
Mine output, Cu content		86,640	73,685	71,200	77,765 r/ 2/	74,269 2/
Metal:						
Smelter:						
Primary e/		95,000	90,000	85,000	95,000	173,000
Secondary e/		33,000	35,000	30,000	35,000	35,000
Total		128,000	125,000	115,000	130,000	208,000
Refined: e/						
Primary		105,000	100,000	95,000	105,000	179,000
Secondary		23,000	25,000	20,000	25,000	25,000
Total		128,000	125,000	115,000	130,000	204,000
Gold:						
Mine output, Au content	kilograms	6,777	5,944	4,400	3,570 r/ 2/	4,986 2/
Metal, primary 3/	do.	10,000	9,000 e/	8,000	8,000	8,000
Iron and steel:						
Iron ore concentrate and pellets:						
Gross weight	thousand tons	21,893	20,930	18,558 2/	20,557 r/ 2/	19,486 2/
Fe content	do.	13,912	12,977	11,506 2/	13,556 r/ 2/	12,811 2/
Metal:						
Pig iron and sponge iron	do.	3,060	3,373	3,212 2/	3,146 2/	3,614 2/
Ferroalloys:						
Ferrochromium		101,842	123,958	131,140 2/	136,000 r/	109,198 2/
Ferrosilicon		22,409	20,356	21,440 2/	20,000	22,000
Total		124,251	144,314	152,580 2/	156,000 r/	131,000
Steel, crude	thousand tons	5,147	5,062	5,075 2/	5,227 2/	5,450 2/
Semimanufactures, rolled	do.	4,545	4,485	4,400	4,500	4,500
Lead:						
Mine output, Pb content		108,600	114,430	116,300 2/	106,584 r/ 2/	85,975 2/
Metal, refined:						
Primary		34,700	40,600	38,000	30,604 r/ 2/	31,322 2/
Secondary		51,500	52,000	48,000	47,255 r/ 2/	44,056 2/
Total		86,200	92,600	86,000	77,859 r/ 2/	75,378 2/
Molybdenum, oxide, roasted, Mo content e/		3,500	3,000	3,000	3,000	3,000
Nickel, metal, secondary e/		100	100	60	50	50
Selenium, elemental, refined e/		20	20	20	20	20
Silver:						
Mine output, Ag content	kilograms	304,048	299,051	284,100 2/	328,737 r/ 2/	306,029 2/
Metal, primary e/ 3/	do.	300,000	250,000	250,000	250,000	250,000
Zinc, mine output, Zn content		155,400	164,711	174,400 2/	176,788 r/ 2/	156,334 2/
INDUSTRIAL MINERALS						
Cement, hydraulic	thousand tons	2,253	2,252 r/	2,298 r/ 2/	2,651 r/ 2/	2,600 2/
Clays, kaolin e/	do.	450	450	450	-- r/ 2/	-- 2/
Feldspar, salable, crude and ground		50,000	45,000	45,000	35,000 r/ 2/	40,450 2/
Fertilizer, manufactured: e/						
Nitrogenous	thousand tons	400	400	400	400	400
Phosphatic	do.	10	10	10	10	10
Mixed	do.	300	300	300	300	300
Graphite		1,470	3,011	4,500	5,108 r/ 2/	963 2/
Lime e/	thousand tons	550 r/	600 r/	500	550	550
Quartz and quartzite e/	do.	500	500	500	500	600
Stone: e/						
Dimension:						
Mostly unfinished	thousand tons	150	150	150	160	160
Granite	do.	100	100	100	130 r/ 2/	128 2/
Limestone	do.	5	5	5	32 r/ 2/	28 2/
Slate	do.	20	20	20	11 r/ 2/	16 2/
Other	do.	10	10	10	8 r/ 2/	5 2/

See footnotes at end of table.

TABLE 1--Continued
SWEDEN: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1997	1998	1999 e/	2000 e/	2001 e/
INDUSTRIAL MINERALS--Continued						
Stone--Continued: e/						
Crushed:						
Dolomite	thousand tons	600	600	600	488 r/ 2/	456 2/
Granite	do.	3,500	3,500	3,500	3,500	3,500
Limestone:						
For cement manufacture	do.	4,000	4,000	4,000	3,770 r/ 2/	4,070 2/
For lime manufacture	do.	1,000	800	800	800	900
For other construction and industrial uses	do.	1,800	1,600	1,600	1,800 r/	1,800
Chalk	do.	30	30	30	30	70
For agricultural uses	do.	400	400	400	450	550
For other uses	do.	1,000	1,000	1,000	1,500 r/	1,500
Total	do.	8,230	7,830	7,830	8,350 r/ 2/	8,890 2/
Sandstone	do.	100	75	75	34 r/ 2/	5 2/
Undifferentiated	do.	25,000	25,000	25,000	30,000	30,000
Other	do.	500	500	500	580 r/ 2/	371 2/
Sulfur, byproduct:						
From metallurgy	do.	71	73	65 2/	91 2/	152 2/
From petroleum	do.	64 r/	60 r/	56 r/ 2/	61 r/ 2/	55 2/
Total	do.	135 r/	133 r/	121 r/ 2/	152 r/ 2/	207 2/
Talc, soapstone e/		25,000	25,000	25,000	20,000 r/ 2/	15,000 2/
MINERAL FUELS AND RELATED MATERIALS						
Coke, metallurgical e/	thousand tons	1,200	1,150	1,200	1,200	1,200
Gas, manufactured: e/						
Coke oven gas	million cubic meters	500	500	500	500	500
Blast furnace gas	do.	3,500	3,500	3,500	3,500	3,500
Peat:						
Agricultural use	thousand cubic meters	1,100	670	1,460 2/	1,500	1,400
Fuel	do.	2,400	390	2,652 2/	1,372 2/	2,496 2/
Petroleum:						
Refinery products: e/						
Liquefied petroleum gas	thousand 42-gallon barrels	3,500	3,000	3,000	3,000	3,500
Naphtha	do.	500	500	500	500	500
Gasoline, motor	do.	36,932 2/	38,862 2/	38,000	39,000	40,000
Jet fuel	do.	1,872 2/	1,288 2/	1,400	1,500	1,500
Kerosene	do.	50	50	50	50	50
Distillate fuel oil	do.	53,152 2/	56,582 2/	56,000	57,000	57,000
Residual fuel oil	do.	35,304 2/	38,508 2/	38,000	39,000	39,000
Other	do.	7,714 2/	7,800	7,800	7,800	7,800
Refinery fuel and losses	do.	5,000	5,000	5,000	5,000	5,000
Total	do.	144,000	152,000	150,000	153,000	154,000

e/ Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. r/ Revised. -- Zero.

1/ Table includes data available through August 13, 2002.

2/ Reported figure.

3/ Includes only that recovered from indigenous ores excluding scrap.

TABLE 2
SWEDEN: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Aluminum		Granges AB (Glencore International AG, 100%)	Sundsvall smelter at Kubikenborg	100
Cement		Cementa AB (Scancem, 100%)	Plants at Degerhamn, Skövde, and Slite	3,400
Copper:				
Ore, copper content		Boliden Mineral AB	Mines at Aitik, Garpenberg, Kankberg, Kristineberg, Langdal, Petiknas, and Renstrom	68
Do.		Outokumpu Oyj	Mines at Viscaria (closed) and Pahtohavare	22
Metal		Boliden Metals AB	Smelter and refinery at Rönnskär	240
Feldspar		Berglings Malm & Mineral AB (Omya GmbH)	Mines at Beckegruvan, Hojderna, and Limbergsbo	50
Do.		Forshammar Mineral AB (Omya GmbH)	Mines at Limberget and Riddarhyttan	30
Do.		Larsbo Kalk AB (Omya GmbH)	Mines at Glanshamar and Larsbo	20
Ferroalloys		Vargon Alloys AB	Plant at Vargon	175
Gold:				
Ore, gold content	kilograms	William Resources Inc.	Björgdal Mine at Skellefta	3,000
Do.	do.	Boliden Mineral AB	Mines at Aitik, Akerberg, Kankberg, Kristineberg, Langdal, Petiknas, and Renstrom	2,000
Metal		Boliden Metals AB	Smelter and refinery at Rönnskär	9
Graphite		Woxna Graphite AB (Tricorona Mineral AB, 100%)	Mine and plant at Kringeltjärn, Woxna	20
Iron ore		Luossavaara-Kiirunavaara AB (Government, 98%)	Mines at Kiruna and Malmberget	28,500
Iron and steel		Svenskt Stal AB (Government, 48%)	Steelworks at Borlänge, Luleå, and Oxelosund	3,500
Kyanite		Svenska Kyanite AB (Svenska Mineral AB, 100%)	Quarry at Halskoberg	10
Lead:				
Ore, lead content		Boliden Mineral AB	Mines at Garpenberg, Laisvall, Langdal, Petiknas, and Renström	110
Do.		North Mining Svenska AB	Zinkgruvan Mine at Ammeberg	20
Metal		Boliden Metals AB	Smelter and refinery at Rönnskär	115
Lime		Euroc Mineral AB	Plants at Limham, Koping, and Storugns	250
Do.		Svenska Mineral AB	Plants at Rattvik and Boda	250
Limestone		Kalproduction Storugns AB (Nordkalk AB, 100%)	Mines at Gotland Island	3000
Marble	cubic meters	Borghamnsten AB	Quarry at Askersund	15000
Petroleum, refined	barrels per day	Skandinaviska Raffinaderi AB	Refinery at Lysekil	210,000
Do.		BP Raffinaderi AB	Refinery at Goteborg	100,000
Do.		Shell Raffinaderi AB	do.	82,000
Do.		AB Nynas Petroleum	Refineries at Goteborg, Malmo, and Nynashamn	54,000
Silver, metal	kilograms	Boliden Metals AB	Smelter and refinery at Rönnskär	300,000
Do.	do.	North Mining Svenska AB	Zinkgruvan Mine at Ammeberg	25,000
Zinc, ore, zinc content		Boliden Mineral AB	Mines at Garpenberg, Laisvall, Langdal, and Renstrom	112
Do.		Zinkgruven Mining AB (North Ltd., 100%)	Zinkgruvan Mine at Ammeberg	60

THE MINERAL INDUSTRY OF

SWITZERLAND

By Harold R. Newman

The reserves of the small deposits of metalliferous ores that existed in Switzerland have been mostly depleted, and metal mining has ceased. Any new metal mining activities are being discouraged for environmental reasons. In 2001, mineral production was limited to mainly industrial mineral commodities required for construction; these included cement, clays, gravel, gypsum, lime, and sand (table 1). The mineral industry is largely controlled by the Government and is owned either privately or by regional governments (table 2). The 26 regional (cantons), or communal, governments grant mining or processing licenses and directly operate electrical generating facilities, gas utilities, local transportation facilities, and water resources

Metal processing was confined to the production of primary and secondary aluminum, secondary lead, and steel. All metal production in Switzerland was from either imported raw materials or scrap. Switzerland relied on imports for many mineral commodities because of self-imposed environmental restrictions and lack of natural resources. Concerns about environmental pollution reportedly caused the adoption of a policy to curtail gradually or perhaps even cease smelting activities.

Alusuisse Sierre AG invested $14 million in a new strip treatment facility for auto body aluminum sheet. When Alcan and algroup merged in October 2000, Alusuisse became part of the Alcan Group of companies. The new factory doubled the production capacity of automotive sheet at Sierre. In 2001, rolled products output was about 90,000 metric tons (t), of which about 40% was supplied to the automotive market; the remainder goes into machinery and other industrial uses. In addition, Alusuisse produced 30,000 t of extrusions and had two of the largest presses in Europe capable of extruding shapes up to 700 millimeters in circumference (Cundy, 2001).

A secondary lead smelter produced antimonial and calcium lead and a small amount of soft solder in bars from recycled batteries. The steel industry in Switzerland was characterized by a relatively small domestic market and a high degree of specialization (table 2).

Switzerland, which is a large diamond center, was actively involved in cutting and polishing diamonds. The country played a big role in international trade activities, although it has no diamond mines and the main diamond centers are in Antwerp, Belgium, London, United Kingdom, and Tel Aviv, Israel.

For more extensive coverage of the mineral industry of Switzerland, see the 2000 Minerals Yearbook, International Review of Europe and Central Eurasia, volume III.

Reference Cited

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TABLE 1
SWITZERLAND: ESTIMATED PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Thousand metric tons unless otherwise specified)

Commodity 3/	1997	1998	1999	2000	2001
METALS					
Aluminum:					
Primary metric tons	27,339 4/	32,062 4/	34,439 4/	35,539 r/ 4/	36,000
Secondary do.	6,000	6,000	15,000	15,000	6,000
Iron and steel:					
Pig iron	100	100	100	100	100
Steel, crude	1,047 r/ 4/	1,018 r/ 4/	1,037 r/ 4/	1,140 r/	1,100
Semimanufactures, rolled products	700	700	700	700	700
Lead, refined, secondary metric tons	6,000	7,600	9,200 r/ 4/	10,100 r/ 4/	9,800
INDUSTRIAL MINERALS					
Cement, hydraulic	3,568 4/	3,600	3,600	3,600	3,600
Gypsum	300	300	300	300	300
Lime	35	35	30	30	30
Nitrogen, N content of ammonia	32	31	32	33 r/ 4/	31
Salt	300	300	300	300	300
Sulfur from petroleum refining metric tons	5,000	4,000	3,000	3,000 r/	3,000
MINERAL FUELS AND RELATED MATERIALS					
Petroleum refinery products:					
Liquefied petroleum gas thousand 42-gallon barrels	2,000	2,000	2,000	2,000	2,000
Gasoline do.	9,000	9,000	9,000	9,000	9,000
Jet fuel do.	2,000	2,000	2,000	2,000	2,000
Distillate fuel oil do.	9,500	9,500	9,500	9,500	9,500
Residual fuel oil do.	5,500	5,500	5,500	5,500	5,500
Bitumen do.	800	800	800	800	800
Refinery fuel and losses do.	2,000	2,000	2,000	2,000	2,000
Total 5/ do.	30,800	30,800	30,800	30,800	30,800

r/ Revised.

1/ Table includes data available through February 2002.

2/ Estimated data are rounded to no more than three significant digits; may not add to totals shown.

3/ In addition to the commodities listed, a variety of crude construction materials (common clay, sand and gravel, and stone) were produced, but output was not reported, and available general information was inadequate to make reliable estimates of output level.

4/ Reported figure.

5/ Total of listed products only.

TABLE 2
SWITZERLAND: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Aluminum	Alusuisse Sierre AG (Alcan Group, 100%)	Smelter at Stag, plant at Sierre	168
Cement	Bundr Cementwerke AG (Holderbank Management and Consulting Ltd., 100%)	Plant at Untervaz	700
Do.	Cementfabrik Holderbank AG	Plant at Rekingen	700
Lead, secondary	Metallum AG	Smelter at Pratteln	13
Refinery, petroleum barrels per day	Reffinerie du Sud-Ouest SA (Compagnie Francaise des Petroles, 49%; British Petroleum, 49%)	Refinery at Collombey	40,000
Do. do.	Reffinerie de Cressier SA (Petroplus International NV, 100%)	Refinery at Cressier	68,000
Salt	Zentralbureu des Vereins der Schweizerischen Rheinsalinen (Government, 100%)	Saline at Schweizerhalle	350
Do.	La Societe des Mines (Canton of Vaud, 100%)	Saline at Bex	50
Steel	Stahl Gerlafingen AG (Swiss Steel AG, 100%)	Plant at Gerlafingen	650
Do.	Von Moss Stahl AG (Swiss Steel AG, 100%)	Plant at Emmenbrucke	300

THE MINERAL INDUSTRY OF

THE UNITED KINGDOM

By Harold R. Newman

Mine production of ferrous and nonferrous metals in the United Kingdom has been declining for more than 20 years as reserves were depleted. Metal processing, however, has remained the basis of a large and economically important mineral industry, and imports were required to satisfy metallurgical requirements.

Operations in the steel sector showed moderate decreases as the demand for steel decreased. The industrial minerals sector has provided a significant base for expanding the extractive industries, and the balance has shifted away from the metallic mineral sector. Companies have a substantial interest in the production of industrial minerals, such as aggregates, ball clay, china clay (kaolin), and gypsum (table 1).

The British economy is largely shaped by market forces with independent regulatory bodies providing additional direction. Government initiatives include continued privatization, deregulation, and support for competition.

Government Policies and Programs

The current statute regarding the development and working of mineral deposits is called the 1971 Act. This act consolidated all earlier planning legislation and has been amended by various statutes. Minerals were defined in section 209 of the 1971 Act to include all minerals and materials in or under land of a kind ordinarily worked for removal by underground or surface workings; it did not, however, include peat cut for purposes other than for sale. Mineral development was specifically addressed in the Town and Country Planning (Minerals) Regulations, 1971, and the Town and Country Planning (Minerals) Act, 1981.

Mineral rights to mineral fuels, such as coal, petroleum, and uranium, belong to the State. The Coal Authority was authorized to license open pit and underground mines to the private sector subject to restrictions on their size and the payment of a royalty on the amount of coal produced.

Most other mineral rights in Great Britain are privately owned. The exceptions are gold and silver, the rights to which are vested in the Royal Family and are referred to as "Crown Rights." A different situation regarding mineral rights applies to Northern Ireland where, under the Mineral Development Act (Northern Ireland), 1969, the right to work minerals and the right to license others to do so are vested in the State.

The United Kingdom is a member of the European Union (EU) but has not committed to adopting the single European currency (Euro). The Government has stated that a decision on whether to do so would be made on the basis of strict economic self-interest and only if approved by the electorate in a public referendum. This was not expected before 2003 at the earliest (U.S. Embassy, London, United Kingdom, 2001).

Environmental Issues

Environmental conditions in the United Kingdom have improved in recent years. Although some pollutants, such as nitrogen oxides, have not decreased substantially, sulfur dioxide emissions have. Reductions of carbon emissions, as well as reduction in other pollutants, such as sulfur dioxide, have resulted primarily from deregulation and privatization of the electricity industry. Privatization led to a reduction in coal subsidies, thus narrowing the price difference between coal and natural gas. As consumers switch to natural gas, the benefits of burning this cleaner fuel were being realized (U.S. Energy Information Agency, 2001b§[1]).

Production

The Department of Trade and Industry (DTI) ensures a continuing supply of minerals for the country's industry and oversees mineral activities. Its areas of responsibility were all nonfuel minerals, which include all metallic ores and such industrial minerals as barite, china clay (kaolin), fluorspar, high-grade limestone, potash, salt, and silica sand. The industrial minerals sector, in particular, was important to the Nation's economy.

Through its Metals and Minerals Branch, the DTI is responsible for mineral fuels, which include coal, natural gas, and petroleum, and for issuing licenses for the exploration, appraisal, and production of natural gas and petroleum.

The Department of Energy was responsible for the minerals that were used in the construction industry. These included aggregates, brick and brick clay, cement and its raw materials, dimension stone, gypsum for plaster, and sand and gravel. State and privately owned corporations produced minerals and mineral-based products. State ownership was mostly in the nuclear power industry (table 2).

Trade

The United Kingdom is the world's fourth largest economy and is a trading nation with a generally free and open market. The United Kingdom had surplus trade balances in chemicals, mineral products, and metal articles. Also, there was a surplus on investment income, which has increased substantially in the past 5 years. The country has run a surplus on trade in services and made up 23% of total exports. Based on 2000 data (the latest date for which data were available), total exports were $271 billion, and total imports were $321 billion (International Trade Administration, 2001§).

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[1] References that include a section twist (§) are found in the Internet References Cited section.

Commodity Review

London-based Billiton plc and BHP Ltd. of Australia, which had a market capitalization of about $30 billion, created one of the largest resource companies in the world. This merger combined two of the world's biggest producers of aluminum, coal, chromium, copper, iron ore, manganese, nickel, and petroleum. Both companies had world class positions in commodity businesses in which the other had no existing exposure. This merger will result in each company gaining exposure to those commodities without the risks normally associated with the exploration and development of new projects and businesses. The European Commission (EC) and the Foreign Investment Review Board of Australian approved the merger in mid-2001. The merged company will be known as BHP-Billiton (Metal Bulletin, 2001c).

Metals

Aluminum.—Of the four primary aluminum smelters in the United Kingdom, three were owned and operated by British Alcan Aluminium Ltd. (the United Kingdom subsidiary of Montreal-based Alcan Aluminium Ltd.). The fourth smelter, which was operated by Anglesey Aluminium Ltd., was owned by Rio Tinto Ltd. (51%) and Kaiser Aluminum and Chemical Corp. of the United States (49%). All the aluminum smelters depended on imported alumina for feedstock.

IMCO Recycling plc was planning to invest more than $7 million in an aluminum dross and scrap recycling facility, pending planning permission. The plant was to be built at Warrington and would process aluminum drosses and other aluminum-bearing residues from Alcan's United Kingdom recycling operations (Metal Bulletin Monthly, 2002).

Secondary aluminum producer Avon Metals Ltd., which was put into receivership at the start of 2001, was bought by scrap merchant Remet Ltd. The business environment for secondary aluminum producers was tough in 2000 and 2001. Its main consumer, the automotive industry, has gone through a difficult time, and over-capacity was a problem in the secondary aluminum industry. The much needed consolidation has proven difficult to achieve. Several attempts to merge a small group of smelters into one group were made, but discussions failed because terms could not be agreed on by the participants (Metal Bulletin, 2001a).

Ferroalloys.—Eastlink Ferroalloys Ltd. was planning to start ferrovanadium alloy production at a rate of from 1,000 to 2,000 metric tons per year (t/yr) at its plant in Glossop. The project was in the development stage and was gearing up for the first phase of production. The company will continue to produce ferromolybdenum in a range of from 4,000 t/yr to 4,500 t/yr; this was down from its previous design capacity of 7,000 t/yr (Metal Bulletin, 2002).

Gold.—Conroy Diamonds and Gold plc reported the discovery of significant quantities of gold in County Armagh in Northern Ireland. The company stated that the new find proved that gold found at its other exploration site at Tullybuck-Lisglassan was not an isolated incident but, instead, part of the larger Armagh-Monaghan gold belt. The existence of gold in the area has been known for 50 years, and the company believed that a number of economic gold deposits might be located over the 1,300 square kilometers of land on which it holds exploration licenses (Engineering and Mining Journal, 2001).

The Bank of England sold 25 metric tons (t) of gold in late January. The bank reported that the gold went for $268 per ounce and was almost five times over-subscribed. This was the fifth sale in a program of six treasury auctions. The Treasury intended to reduce its gold reserves to 320 t. When the final auction is completed in 2002, the Treasury will have sold 395 t of gold in its 3-year program (Metal Bulletin, 2001b).

Iron Ore.—Production of iron ore was limited to a small amount of hematite ore mined by Egremont Mining Co. at the Florence Mine in Cumbria. The output went for pigments and foundry annealing uses rather than metal production.

Steel.—The Corus Group, which had been created in 1999 by the merger of British Steel plc. of the United Kingdom and Koninklijke Hoogovens NV of the Netherlands, was the fifth largest steel producer in the world in 2000 after Pohang Iron and Steel Co. Ltd. of the Republic of Korea, Nippon Steel Corp. of Japan, Arbed Group of Luxembourg, and Usinor Group of France. Although traditional ingot casting was still used in the manufacture of certain grades of steel, most of the output was by means of continuous casting. Corus was also Europe's top tinplate producer with production of about 1.5 million metric tons per year (Mt/yr) (Metal Bulletin, 2001d).

Corus announced a strategic review that will cut more than 3 million metric tons (Mt) of iron and steel capacity from its United Kingdom operations and will result in more than 6,000 job losses. By 2003, Corus will be left with 22,000 workers in the United Kingdom compared with 300,000 workers in 1970. This reduction will have an adverse effect on the refractories industry and force manufacturers, traders, and raw materials suppliers to reassess their refractories sales and production patterns (Industrial Minerals, 2001c).

Tin.—The South Crofty Mine in the county of Cornwall, which was the last United Kingdom producing tin mine, was acquired in 2000 by Baseresult Ltd., which bought the 8.6 million shares of South Crofty Holding Ltd. South Crofty had been allowed to flood when it was closed in March 1998. Baseresult announced that the mine would be reopened. Pumping water from the mine began late 2001. The cost of returning the mine to its preclosure state was estimated to be more than $3 million. The Wheal Jane Mine's plant processing equipment would be transferred to the nearby South Crofty Mine. Baseresult expected to start producing tin concentrate by 2003. Reserves were estimated to be sufficient to produce 200,000 t/yr of tin ore (Metal Bulletin, 2001e).

The only other tin mining activity was a very small scale production of cassiterite by a tourist operation, which smelted the ore onsite to produce metallic tin for jewelery and ornaments.

Zinc.—MIM Holdings Ltd. announced that it would sell its zinc smelters at Avonmouth, United Kingdom, and Duisberg, Germany, following poor performances during the 12 months to June 30, 2001. The company did an evaluation of its European zinc assets and decided that they were not core businesses and would be sold. The smelters are not the most efficient in the world and would need a lot of investment to get them producing at capacity. Also, a capacity of 80,000 t/yr at Avonmouth and 85,000 t/yr at Duisberg placed the two operations among Europe's smallest zinc smelters (Mining Journal, 2001b).

Industrial Minerals

Cement.—The United Kingdom's two largest cement producers were Blue Circle Industries plc. (BCI) and Castle Cement Ltd. The third producer was the Rugby Group. BCI had 10 plants which included 1 in Northern Ireland. Castle has four plants, which included one grinding plant. Rugby had six plants (table 2).

Blue Circle accepted the $4,400 million second takeover bid of Lafarge SA of France; Lafarge raised its original bid by 13%. If accepted by shareholders, then the deal would create the world's largest cement producer with a global production capacity of 150 Mt/yr (Industrial Minerals, 2001a).

Clays.—The United Kingdom was a leading world producer and exporter of ball clay and china clay (kaolin). Watts, Blake, Bearne & Co. plc (WBB) was the country's largest producer of ball clay. English China Clays (ECC) International Ltd. was the largest producer of china clay and one of the major producers worldwide. Operations were mainly in the southwestern area of the United Kingdom.

In October 2001, WBB and Sibelco Minerals and Chemicals Ltd. merged. The merged business (WBB Minerals) will have an almost 11-Mt/yr sales volume that will comprise approximately equal amounts of white firing clays, red firing clays, and industrial sands ranks the group as the country's leading industrial minerals supplier (Industrial Minerals, 2001d).

ECC International Ltd. operated ball clay and kaolin mines and quarries in the Wareham basin, Dorsetshire; the Bovey basin, southern Devon; and the Petrockstowe basin, northern Devon. A majority of the production was from the Bovey Basin.

Gypsum.—British Gypsum Ltd. (a subsidiary of BPB Industries plc.) was the major producer of gypsum in the United Kingdom. The company had mines in Cumbria, Leicestershire, Nottinghamshire, Staffordshire, and Sussex that produced about 1.5 Mt/yr of gypsum. With few exceptions, this material went to supply the domestic market.

Potash.—Cleveland Potash Ltd. (CPL), which was the only potash producer in the United Kingdom, operated the Boulby Mine in Yorkshire. CPL also mined rock salt as a coproduct from an underlying seam in the Boulby Mine. The seam of potash extends out under the North Sea and occurs at depths of between 1,200 and 1,500 meters (m) in a seam that ranged up to 20 m but averaged 7 m in thickness. Within a Permian evaporite sequence, silvinite ore comprises 35% to 45% sylvite and 45% to 55% halite plus impurities. The sedimentary strata above the evaporites include the Triassic Sherwood sandstone, which contains brine under high pressure. During extraction, pressured gas will occasionally cause blowouts in the shaly parts of the potash (Cleveland Potash Ltd., 2001§).

Silica.—The DTI, which accepted the recommendations of Competition Commission (CC) and the Director General of Fair Trading, decided that SCR Sibelco SA should be required to divest Fife Sands plc (FSS) and Fife Resources plc, which it acquired in 2000. Sibelco's share of the 1.8-Mt/yr domestic silica sand market rose to between 75% and 90% after the acquisition. The CC ruled that without the restraint of FSS's competition, glass sand prices in the United Kingdom would be likely to rise (Industrial Minerals, 2001b).

Stone, Dimension.—Most slate mining in the United Kingdom was in northern Wales; additional mining operations were in Cornwall and the Lake District. Alfred McAlpine Slate Ltd. was the owner and operator of the Cwt y Bugail, Ffestiniog, and Penrhyn quarries in northern Wales. The 2,415 by 805-m Penrhyn quarry at Bethesda was considered to be the world's largest slate quarry. It has been in operation for more than 400 years.

Mineral Fuels

The Government initiated an energy study to review the long-term energy objectives, which included the challenge of global warming. The United Kingdom was self-sufficient in energy at competitive prices and the sources of supply are diverse. The study will consider the role of coal, natural gas, petroleum, and renewables and the future of nuclear energy. Many are concerned that in the future, the country could become increasingly reliant on imported fuel, particularly natural gas, which accounted for about 37% of primary energy consumption. Petroleum accounted for 35%; coal, 16%; and nuclear energy, about 11%. The balance was provided for by hydropower and other renewable resources. The country could be importing 15% of its gas requirements by 2005 compared with 2% in 2001 (Mining Journal, 2001e).

Coal.—The EC gave approval to the Government to give $9 million in state aid to two coal mines that posted operating losses for 2000 and 2001. The money will go to the Longannet Mine ($7.7 million) in Scotland and the Aberpergwm Mine ($1.3 million) in Wales. The EC had previously authorized the Government to grant operating costs aid to the Longannet Mine. The aid was intended to be used to improve the economic viability of the production units by reducing production costs to make them competitive enough to survive beyond 2002 without public subsidy (Mining Journal, 2001a).

As a further example of commitment to the coal industry, the Government will make aid payments of $30 million to four other coal mines following EC approval. The beneficiaries will be the Blaentillery Mine in Mid Glamorgan, the Hae Royds Mine near Huddersfield, the Moorside Mine near Sheffield, and the Selby Mine in North Yorkshire. The money will help protect more than 1,000 jobs and was part of the Government's Coal Operating Aid Scheme (Mining Journal, 2001c).

The Coal Authority reported 55 coal mining licence applications and 11 coal bed methane (CBM) applications. Interest was continuing in CBM potential with ongoing research into ways to harness the CBM. Aside from its licensing activities, the Coal Authority is charged with providing information that relates to geologic data and coal mining plans. The Coal Authority also settles subsidence claims and manages issues related to property and liabilities from previous coal mining activities (Mining Journal, 2001d).

Most of the coal mining industry was owned by UK Coal plc (formerly RJB Mining plc), which was the largest coal mining company in the United Kingdom and the largest independent coal producer in the EU. UK Coal operated 13 underground and 6 open pit mines, which produced more than 20 Mt of coal. The largest operation was the underground Selby Complex which consisted of Riccall/Whitmoor, Stillingfleet Combine, and Wistow (Mining Magazine, 2001).

Natural Gas and Petroleum.—*North Sea.*—The North Sea holds Europe's largest natural gas and petroleum reserves and was one of the world's key producing regions not in the Organization of the Petroleum Exporting Countries (OPEC). The offshore United Kingdom sector of the 37-year-old North Sea oilfield continued to be significant in international petroleum and natural gas activities. As a result, the country has become the headquarters for international oil companies and a major energy supplier to other countries. The United Kingdom and Norway were the largest producers of North Sea oil by a large margin. Denmark, Germany, and the Netherlands were smaller North Sea oil producers (U.S. Energy Information Agency, 2001a§).

North Sea petroleum output declined in 2001 for the second year running to its lowest level in 8 years. Production decreased by an estimated 15% in what some analysts described as the beginning of the end for the country's petroleum bonanza. Natural gas maintained its level; it was, however, expected to start to decline in 5 years as the larger fields are depleted (Alexander's Gas and Oil Connections, 2002§).

Offshore/Onshore.—Exploration for petroleum on the Falkland Islands Continental Shelf is governed by Falkland Islands law. These provisions are independent of the United Kingdom laws and regulations; there are, however, many similarities to the United Kingdom North Sea regime.

The North Falkland Basin was the location of interest for drilling activity. The Falkland Hydrocarbon Consortium, which was a group of United Kingdom companies, was trying to revive the hunt for potentially rich petroleum and natural gas reserves. The Consortium was in the process of filing for exploration licences and meeting with the Falkland Government. Falkland Islands Holdings, which was the entity that handled trade between the islands and the United Kingdom, had a 10% stake in the consortium (Alexander's Gas and Oil Connections, 2001a§).

In mid-2001, the DTI announced the 10th round of onshore licensing. The latest round will follow recent practice and invites applications for Petroleum Exploration and Development Licences over all unlicenced acreage in Great Britain above the Mean High Water Mark. Applications for traditional oil and gas exploration, and also CBM, are expected either by direct drilling or by collecting gasses released from abandoned coal workings (British Geological Survey, 2001).

Renewable Energy.—The Government believed that advances in green technology will see the cost of wind power dropping significantly during the next 20 years and undercutting electricity from conventional power stations. Onshore wind costs have dropped by a factor of four in the past 10 years. Wind-generated energy was expected to grow, and the Government's goal was to increase production of renewable energy from 2.8% in 2001 to 10.4% by 2011. This would help cut greenhouse gas emissions, which has been seen by many scientists as contributing to global warming. The Government aimed to cut such emissions by 23% by 2010 from 1990 levels (Alexander's Gas and Oil connections, 2001b§).

Outlook

The United Kingdom is a significant player in the world mining and mineral processing industries. This is more the result of an extensive range of companies in the country that have various interests in the international mineral industry rather than the domestic mineral industry. This situation is expected to continue.

Exploration for petroleum and natural gas is expected to continue onshore and offshore. Onshore exploration activities will be directed mainly toward gold. Offshore petroleum and natural gas exploration interest will continue to be focused on North Sea areas, particularly in the areas west of the Shetland Islands, the central North Sea, and the southern gas basin of the North Sea.

The DTI is expected to continue to be involved in the development of mineral resources. Efforts to raise the level of environmental management and to maximize the best use of natural resources, which will include the use of recycled materials and renewable energy sources, will continue to be evaluated and developed.

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TABLE 1
UNITED KINGDOM: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity	1997	1998	1999	2000	2001 e/
METALS					
Aluminum:					
Alumina from imported bauxite e/	100,000	96,000	90,000	88,500 r/	90,000
Metal:					
Primary	247,675	258,397	272,211	305,100	340,800 2/
Secondary	257,800	236,000 e/	274,800	285,300	237,700 2/
Cadmium, metal including secondary	455	440 e/	547	503 r/	485 2/
Copper, metal, refined:					
Primary	9,000 e/	7,000	--	-- r/	-- 2/
Secondary	51,402	47,774	50,334	3,000 r/	-- 2/
Total	60,402	54,774	50,334	3,000 r/	-- 2/
Iron and steel:					
Iron ore:					
Gross weight	1,210	1,188	1,000 e/	1,033	500
Fe content (54% Fe)	653	642	568 e/	540	270
Metal:					
Pig iron thousand tons	13,057	12,569	12,399	10,989	9,861 2/
Steel, crude do.	18,528	17,007	16,634	15,306 r/	13,610 2/
Steel, hot rolled do.	16,149	15,214	14,334	13,173 r/	11,369 2/

See footnotes at end of table.

TABLE 1--Continued
UNITED KINGDOM: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1997	1998	1999	2000	2001 e/
METALS--Continued						
Lead:						
Mine output, Pb content e/		1,800	1,800	1,000	1,000	1,000
Metal:						
Smelter:						
Bullion from imported concentrate		38,500 e/	37,927	40,177	36,700	40,000
Secondary (refined) e/ 3/		100,000	100,000	100,000	100,000	100,000
Total e/		139,000	138,000	140,000	137,000	140,000
Refined:						
Primary 4/		215,243	186,212	185,422	166,411	203,000
Secondary 3/		175,783	163,492	162,651	170,740	163,000
Total		391,026	349,704	348,073	337,151	366,000
Magnesium, metal, secondary including alloys e/		1,000	1,000	500	500	500
Nickel, metal, refined 5/		36,586	41,994	39,467	37,976	33,817 2/
Tin, mine output, Sn content		2,396	400 e/	--	-- e/	--
Zinc, metal, smelter		107,704	99,600	132,800	99,600	100,000
INDUSTRIAL MINERALS						
Barite e/ 6/		74,000	68,000	59,000	55,000	66,000
Bromine		35,600 r/	35,900	55,000 e/	50,000 e/	50,000
Cement, hydraulic	thousand tons	12,638	12,409	13,027 r/	12,702 r/	11,854 2/
Clays:						
Fire clay e/	do.	338 2/	500	575	595 r/	600
Fuller's earth e/ 7/	do.	135 2/	95	75	66 r/	52
Kaolin (China clay) 8/	do.	2,360	2,392	2,304	2,420	2,400
Ball clay and pottery clay e/ 8/	do.	916 2/	960	985	1,000	1,000
Other, including shale e/	do.	12,000	10,000	12,500	12,000	12,000
Feldspar (china stone) e/		8,000	3,278 2/	3,000	2,000	2,000
Fluorspar, all grades e/ 9/		67,000	65,000	40,000	36,000	50,000
Gypsum and anhydrite e/	thousand tons	2,000	2,000	1,800	1,500	1,500
Lime, quicklime and hydrated e/	do.	2,500	2,500	2,500	2,500	2,500
Nitrogen, N content of ammonia	do.	642	871	901	814	850
Potash, K_2O equivalent		564,500	608,400	494,700	600,000 r/	532,000
Salt: e/						
Rock	thousand tons	1,800	700	1,500	1,700	1,900
From brine	do.	1,300	1,300	1,300	1,200	1,200
In brine, sold or used as such	do.	3,561 2/	3,500	3,000	3,000	3,000
Sand and gravel: e/						
Common sand and gravel	do.	99,800	98,315 2/	100,953 r/	101,621 r/	104,670 2/
Industrial sand	do.	4,800	4,662 2/	4,092 r/	4,095 r/	4,100
Sodium compounds, n.e.s, carbonate e/	do.	1,000	1,000	1,000	1,000	1,000
Stone:						
Crushed:						
Calcite e/	do.	13	15	--	--	--
Chalk	do.	9,550	9,934	10,000 e/	10,000 e/	10,000
Dolomite	do.	18,282	15,622	13,698	14,000 e/	14,000
Igneous rock	do.	48,656	45,807	53,155 r/	54,113 r/	53,190 2/
Limestone	do.	87,752	88,979	86,933	86,000 e/	86,000
Sandstone	do.	18,499	20,129	15,485	15,000 e/	15,000
Slate including fill	do.	347	450	425	350 e/	350
Total	do.	155,254	155,365	169,541	175,000 e/	175,000
Dimension: e/						
Igneous	do.	100	138	140	125	125
Limestone	do.	225	225	295	300	300
Sandstone	do.	275	287	290	300	300
Slate	do.	85	69	70	70	70
Sulfur, byproduct: e/						
Of metallurgy		39,200	40,500	61,000 2/	51,400 2/	69 3/
Of petroleum refining		137,000	184,000	136,000	140,000 r/	111 3/
Total		176,000	225,000	197,000	191,000 r/	180,000 3/
Talc, soapstone, and pyrophyllite e/		5,500	4,937 2/	5,000	5,000	5,000
Titania e/ 10/		200	200	200	200	200

See footnotes at end of table.

TABLE 1--Continued

UNITED KINGDOM: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity	1997	1998	1999	2000	2001 e/
MINERAL FUELS AND RELATED MATERIALS					
Coal:					
Anthracite e/ thousand tons	1,000	1,000	1,000	797 2/	616 2/
Bituminous including slurries, fines, etc. do.	46,981	40,272	36,450	31,175	31,512 2/
Lignite do.	1	1	--	-- e/	--
Total e/ do.	48,000	41,300	37,500	31,972 3/	32,128 2/
Coke:					
Metallurgical	6,178	6,178	5,837	6,058	6,000
Breeze, all types	44 e/	37	33	37	36
Fuel briquets, all grades	814 e/	616 e/	635	537	550
Gas, natural:					
Marketable 11/ million cubic meters	91,800 e/	95,503	104,900	95,854 r/	96,000
Marketed e/ 12/ do.	66,000	68,000	70,000	70,000	70,000
Natural gas liquids 13/ thousand 42-gallon barrels	55,391	58,877	61,859	62,000 e/	62,000
Peat cubic meters	1,619	1,076	1,000 e/	1,000 e/	1,000
Petroleum:					
Crude 14/ thousand 42-gallon barrels	902,408	931,665	961,965	884,115 r/	820,845 2/
Refinery products:					
Liquefied petroleum gases do.	24,232	25,265	24,406	25,000 e/	25,000
Naphtha including white spirit do.	24,259	21,148	21,675	22,000 e/	22,000
Gasoline do.	249,210	240,210	232,832	230,000 e/	230,000
Jet fuel do.	66,763	63,536	59,032	60,000 e/	60,000
Kerosene do.	25,854	26,900	27,714	28,000 e/	28,000
Distillate fuel oil do.	214,684	207,828	195,280	195,000 e/	195,000
Residual fuel oil do.	87,633	74,000	68,591	68,000 e/	68,000
Lubricants do.	8,617	7,938	6,440	6,500 e/	6,500
Bitumen do.	13,683	13,271	10,102	10,000 e/	10,000
Petroleum coke do.	5,600	5,500	5,000 e/	5,000 e/	5,000
Petroleum wax do.	325	350	472	400 e/	400
Unspecified e/ do.	30,300	30,000	30,000	30,000 e/	30,000
Refinery fuel and losses e/ do.	35,000	25,000	25,000	25,000 e/	25,000
Total e/ do.	786,000	741,000	707,000	705,000 e/	705,000

e/ Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. r/ Revised. -- Zero.

1/ Table includes data available through May 2002.

2/ Reported figure.

3/ Includes a small quantity of primary lead from domestic concentrate.

4/ Produced entirely from imported bullion and includes the lead content of alloys.

5/ Refined nickel and nickel content of ferronickel.

6/ Includes witherite.

7/ Salable product.

8/ Sales, dry weight.

9/ Proportions of grades not available; probably about two-thirds acid grade.

10/ Sales.

11/ Methane, excluding gas flared or reinjected.

12/ Marketable methane, excluding that used for drilling, production, and pumping operations.

13/ Includes ethane, propane, butane, and condensates, respectively.

14/ Excludes gases and condensates.

TABLE 2
UNITED KINGDOM: STRUCTURE OF THE MINERAL INDUSTRY IN 2001
(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Aggregate	ARC Ltd. (Hanson Plc., 100%) Foster Yoeman Ltd.	50 quarries in various locations	50.000
Do.	do.	Glensanda quarry at Oban	15,000
Aluminum, primary	British Alcan Aluminium Ltd.	Fort William, Kinlochleven, and Lynemouth	175
Do.	Anglesy Aluminium Ltd. (Rio Tinto Corp., 51%; Kaiser Aluminum and Chemical Corp., 49%)	Holyhead, Wales	113
Aluminum, secondary	Trent Alloys Ltd. (Cookson Group, 100%)	North Cave, Humberside	30
Do.	Deeside Aluminium Ltd.	Clwyd, Wales	45
Ball clay	Watts, Blake, Bearne & Co. Plc.	Various operations in northern and southern Devon	500
Barite	Laporte Industries Plc.	Mines in Derbyshire	25
Celestite	Bristol Minerals Co. Ltd.	Yate, Avon	30
Cement	Aberthaw and Bristol Channel Portland Cement Co. Ltd.	East Aberthaw and Rhoose, Glamorgan	1,000
Do.	Blue Circle Industries plc.	Plants at Aberthaw, Cauldon, Dunbar, Hope, Masons, Northfleet, Plymstock, and Weardale	7,300
Do.	Castle Cement Ltd. (Scancem, 100%)	Plants at Ketton, Ribblesdale, Pades, and Pitstone	3,400
Do.	Rugby Group	Plants at Barrington, Chinnor, Rochester, Rugby, and South Ferriby	2,700
China clay (kaolin)	Imerys Group.	Mines and plants in Cornwall and Devon	3,000
Coal million metric tons	UK Coal plc.	19 mines in various locations	30
Copper	IMI Refiners Ltd.	Refinery at Walsall, west Midlands	80
Ferroalloys	British Steel Plc.	Teesside, Cleveland	80
Do.	Murex Ltd.	Rainham, Essex	25
Do.	London and Scandinavian Metallurgical Co. Ltd.	Rotherham, South Yorkshire	30
Do.	Eastlink Ferroalloys Ltd.	Glossop	1.2
Fluorspar	Durham Industrial Minerals Ltd.	Mines in Weardale	50
Do.	Laporte Industries Plc.	Mill at Stoney Middleton, mines in Derbyshire	70
Gypsum	British Gypsum Ltd.	Mines in Cumbria, Nottinghamshire, and Sussex	3,500
Lead, refined	Britania Refined Metals Ltd.	Northfleet, Kent	165
Lead, secondary	H.J. Enthoven and Son Ltd. [Billiton (U.K.) Ltd., 100%]	Darley Dale, Derbyshire	60
Lead, smelter	MIM Holdings (U.K.) Ltd.	Avonmouth, Avon	55
Natural gas billion cubic feer per year	Amoco Ltd., British Petroleum Ltd. Esso (U.K.) Ltd., Phillips Petroleum Co. Plc., Shell (U.K.) Ltd.	North Sea gasfields	1,250
Nickel, refined	INCO Europe Ltd. (INCO Ltd., Canada)	Clydach, Wales	30
Nitrogen, N content of ammonia	Terra Nitrogen Ltd.	Billingham	550
Petroleum, crude million 42-gallon barrels per year	Amoco Ltd. , British Petroleum Ltd., Chevron Ltd., Esso (U.K.) Ltd., Occidental Petroleum Co. Ltd., Shell (U.K.) Ltd., Texaco, Unocal, Inc.	North Sea oilfields	2.1
Petroleum, refined do.	British Petroleum Ltd., Conoco Ltd., Mobil Oil Co. Ltd., and others	11 refineries in various locations	2.3
Platinum-group metals	Johnson Matthey Plc.	Refineries at Enfield (London) and Royston	20
Potash	Cleveland Potash Ltd.	Boulby Mine, Yorkshire	500
Salt, rock	Imperial Chemical Industries Plc.	Mines at Winsford, Cheshire	3,000
Do.	Irish Salt Mining and Exploration Co.	Mine at Carrick Fergus, Northern Ireland	300
Sand and gravel	TMC Pioneer Aggregates Ltd.	Chelmsford, Essex	1,000
Silica sand	Hepworth Minerals and Chemicals Ltd.	Operations in Cambridgeshire, Cheshire, Humberside, and Norfolk	6,000
Slate, natural	Alfred McAlpine Slate Ltd.	Penrhyn quarry, Bethesda, Wales	25
Steel	British Steel Plc.	4 intergrated steelworks in Gwent, Lanark, Humberside, and Cleveland	18,000
Talc	Alex Sandison and Son Ltd.	Unst, Shetland Islands	15
Do.	Shetland Talc Ltd. (Anglo European Minerals Ltd., 50%; Dalriada Mineral Ventures Ltd., 50%)	Cunningsburg, Shetland Islands	35
Tin, ore	Baseresult Ltd.	South Crofty Mine, Cornwall (closed March 1998)	1,800
Titanium, sponge	Deeside Titanium Ltd.	Plant at Deeside, Clyde	5
Zinc, smelter	MIM Holdings (U.K.) Ltd.	Avonmouth, Avon	120

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